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1984 Phase I Baseline Study: Final Report

Montana Department of  
Natural Resources  
& Conservation

U.S. Department of Energy  
Bonneville Power Administration

November 1984

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Garrison-Spokane 500-kV Transmission Project

HUNTER SURVEY FINAL REPORT

PHASE I - BASELINE STUDY

November 1984

SUBMITTED TO

State of Montana

USDOE Bonneville Power Administration

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## EXECUTIVE SUMMARY

The State of Montana, in cooperation with the U.S. Forest Service and the Bonneville Power Administration, is conducting a five-year study on the impacts on elk security habitat and hunter opportunity in western Montana of a 500 kV transmission line. Potential impacts stem from the new and upgraded access roads required for the line, which may reduce summer/fall security habitat and make hunting areas less remote. The line itself could affect the aesthetics of popular hunting areas located along the route.

As part of this monitoring program, the Montana Department of Natural Resources and Conservation is surveying hunters at seven check stations in the project's two study areas. The hunter survey research has three phases. Phase I was conducted in fall, 1983, to collect baseline data on hunting use and quality in the study areas. After the line is constructed and energized, the Phase II survey, scheduled for fall, 1985, will test hypotheses developed from baseline data to assess the project's impacts on hunting use. During Phase III, scheduled for fall, 1986, the persistence of any impacts identified will be measured. Reports from each phase will be issued to the Interagency Wildlife Technical Committee (chaired by the Bonneville Power Administration). The data will also be used by the Montana Department of Fish, Wildlife, and Parks, both to help manage elk and to assist in U.S. Forest Service land management planning.

In Phase I of the study, over 600 hunters were interviewed using a questionnaire developed by DNRC and reviewed extensively by state and federal agencies. The survey form contained questions on hunters' reasons for choosing the study areas as places to hunt, hunting success and related information, previous hunting experience, hunting area evaluations, place of residence, and age.



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The data were tabulated to describe the 1983 baseline data, and then subjected to cluster analysis. This statistical technique, used in several past studies of hunting, grouped hunters into clusters or types based on the importance they attached to each of seven reasons for hunting in the study areas. This procedure identified seven subgroups of hunters having similar patterns of response to these items. DNRC hypothesized that each of the seven hunter types will be affected differently by the transmission line and its access roads. Some will likely view the changes as negative, some will be attracted to the altered setting, and some may be indifferent.

Specifically, the cluster analysis showed that about three-quarters of the hunters interviewed have characteristics that could make them vulnerable to the line's potential impacts. Two of the clusters (containing 27 percent of the hunters) are expected to perceive the changes in the hunting setting as either beneficial or unimportant. Three of the clusters (43 percent of the hunters) will likely be affected by the increased road access, although gating roads would reduce the impact for many hunters. The impacts to another cluster (16 percent of the hunters) were difficult to predict. Hunters forming the final cluster, 14 percent of those interviewed, will likely view the line-induced changes as detrimental to their hunting activities and may discontinue hunting in or near the study areas, even though they currently consider them their favorite places to hunt.

The next phase of the study will test these hypotheses and assess the impacts of the line on the quality and quantity of elk hunting in the study areas. When combined with the biological data on elk being collected as another part of the monitoring effort, this information should provide a valuable data base for resource managers.



## INTRODUCTION

In the spring of 1983, Bonneville Power Administration (BPA) began clearing the right-of-way for a 158-mile-long section of a 500 kilovolt transmission line across western Montana. The section of line under study will transfer power generated at Colstrip from Garrison to a substation at Taft near the Idaho border.

The final route for the transmission line was chosen from many alternatives, each having different levels of effect on the Montana environment. The state and federal agencies locating the line gave considerable weight to social concerns in the siting process, choosing a route that crossed very little private land. In western Montana, this meant avoiding the valleys and crossing National Forest lands that provide a wide spectrum of wildlife habitat and dispersed recreation settings.

In its final report on the project, the Montana Department of Natural Resources and Conservation (DNRC) said that the chosen route would affect fewer people and fewer homes than the other routes, but would have greater potential to damage natural systems (DNRC 1983). BPA's final EIS for the project said that a program would be developed to monitor the line's impacts and assess the effectiveness of mitigation measures (BPA 1983).

Of particular concern to state and federal agencies was the potential for adverse effects on hunting opportunity; the line would cross areas providing secure summer and fall habitat for elk and other big game species. Among these were three areas that had been evaluated under the Forest Service's Roadless Area Review and Evaluation process (RARE II). Habitat security in roadless areas is essential to allow elk to hide from hunters (Lonner and Cada 1982).

Not only does hunting contribute to the economy of western Montana, it is an integral part of many Montana residents' lifestyles, and probably one of the reasons many people choose to live and visit here. DNRC hypothesized that the line could have three main types of effects on hunting opportunities in western Montana:

1. The many miles of new and upgraded roads needed to construct the line and maintain access to the towers may increase hunter access to these areas, potentially increasing elk vulnerability and kill rates, and reducing available secure habitat.
2. The increased access could make the areas less remote, both physically and perceptually. Hunters desiring a remote setting would be less satisfied, while road hunters or others desiring improved access would benefit;
3. The transmission line itself, with its 175-foot tall steel lattice towers and 125-foot selectively cleared right-of-way, could intrude on the naturalness of the area, decreasing the quality of the experience for hunters who value aesthetics.

#### THE ELK MONITORING STUDY

DNRC, in cooperation with BPA, the Forest Service, Bureau of Land Management, and DFWP is monitoring transmission line impacts to elk habitat and hunting opportunity, and will explore the potential to reduce any significant impacts identified. The monitoring program has three main objectives:



1. Determine the changes in elk use of summer/fall security area habitat due to the construction of access roads and operation of the transmission line.
2. Determine the changes in hunting opportunity and quality caused by operation of the line and access roads.
3. Provide for integration of the elk monitoring study data into future logging plans for specific projects and the forest planning process.

The five-year monitoring program contains biological and social components. Current animal use of elk habitat, the extent and quality of elk habitat affected by construction, elk response to construction and operation disturbances, and elk population characteristics are being measured through ground and aerial surveys incorporating radio telemetry (Interagency Technical Committee 1984).

For the social portion, hunters are being interviewed in the field at three times: in 1983 before construction; in 1985 after the line is built and energized; and in 1986, to see if any changes in hunting patterns remain over time. The baseline survey will also serve as a pilot study, to help develop hypotheses and research designs for the subsequent phases (Interagency Technical Committee 1984).

#### Study Areas

The elk and hunter studies are taking place in three areas located along the transmission line route: the Harvey/Eight Mile, Middle Fork Rock Creek, and Packer Creek areas. The latter two areas were formerly combined into a single study area called Twin/Savenac Creek, but were split once the study area boundaries were more clearly defined. These were chosen because they contain elk security habitat, support large elk populations, and represent the various climatological and vegetational characteristics of lands along the route. In addition, the Forest



Service is planning timber sales near each of the areas. Another criterion was ease of measuring hunter use; seven check stations were adequate to cover primary access points into the three study areas. Car counters were installed by DFWP at or near each check station to compare use levels during general hunting season with use before and after.

Use of the Harvey/Eightmile study area, about 13,000 acres in the John Long Mountains south of I-90 and between Rock Creek and Hall, was measured by check stations at Harvey Creek and Beavertail. The Harvey Creek check station, most remote of the seven, was located about 18 miles west of Hall on the Harvey Creek road just past its junction with the Teaken-Komich road. Access to Hall is by Highway 10A south of Drummond, which is on I-90 about 47 miles southwest of Missoula. The road to the study area forks 1.5 miles beyond the check station. The left fork crosses a tiny bridge at Harvey Creek and ends a mile later on a ridge, while the right dead-ends at a primitive camping area on the creek after crossing a steep slope for .4 miles.

The other check station monitoring use of the Harvey Eightmile study area was located 10 miles up the Sliderock-Gillespie road from the Beavertail Hill exit on I-90, about 27 miles southwest of Missoula. Along the ten-mile stretch of gravel road, a network of roads reaches east toward the Rock Creek drainage, but nearly all are closed by locked gates during hunting season. The area is logged extensively and contains many clearcuts. The road ends past the check station, so hunters have to pass it on their way out of the study area.

The Middle Fork Rock Creek study area, about 6,000 acres north of I-90 between Twelve Mile road and DeBorgia, was monitored by three check stations (see Figure 2). The easternmost, called Cabin City, was located on the well-traveled Twelvemile road, .2 miles past a turnoff to Cabin City, a developed campground. This check

station is about 90 miles northwest of Missoula, a short distance off I-90. Nearby is the intersection with the Camel's Hump road, another popular route going from St. Regis to the Twelvemile road exit on the Interstate. Access to Thompson Falls and a host of forest roads is possible from the check station.

The Middle Fork Rock Creek check station, not far from Cabin City, was located on Road 444, which passes in a series of switchbacks through the middle of the study area after leaving Twelvemile road .1 miles past I-90. It is possible to connect with another road system beyond the study area, eventually reaching Thompson Falls.

The Thompson-DeBorgia road forms the western boundary of the Middle Fork Rock Creek study area. The DeBorgia check station was located about two miles up this road (number 378) from the DeBorgia exit on I-90, three miles west of the Twlevemile road exit. Although this road also winds up at Thompson Falls, a series of extremely steep switchbacks is encountered a short distance beyond the check station.

The Packer Creek study area, about 9600 acres located north of I-90 between Haugen and Saltese, was monitored by two check stations (see Figure 3). At the eastern edge of the Packer Creek study area, the Haugen check station was on road 288 about five miles off the Haugen exit on I-90. After one mile, this road branches into the Packer, Timber, and Cruzane Mountain roads. The Packer road goes west, then south to meet the Interstate at Saltese, thus forming a loop with I-90. Haugen is about three miles west of the DeBorgia exit.

At the other end of the road from Haugen, the Saltese check station was located near the Packer Creek bridge several miles from I-90, about five miles west of Haugen. This was the only check station with several residences clustered between it and the study area, but it was chosen because of the lack of alternative sites in the vicinity.

## The Hunter Survey

The preconstruction survey was designed to obtain baseline information on current hunter use of the study area. From this, hypotheses were developed to predict how different types of hunters will be affected by the transmission line. This required a description of current users of the study areas. It was necessary to know not only who they were, where they were from, and how often they hunted in the study areas, but why they chose the study areas as recreation settings, and how these areas compared to their other hunting grounds. This information should help assess the hunters' responses to changes caused by the transmission line (Manfredo, Driver, and Brown 1983).

Given the link between desires for specific experiences and a preference for certain recreation settings (Brown and Ross 1982), changes in the character of the hunting areas, and particularly changes in the attributes that cause hunters to hunt in particular areas, could decrease the chance of hunters having desirable experiences (Clark and Stankey 1979).

If the setting attributes valued by hunters change, and settings similarly valued are unavailable (or farther away), then current hunters may have to use the altered area, perhaps decreasing hunting satisfaction, or find a substitute. Hunters previously using the area could choose to move into adjacent areas, increasing hunting pressure there and on private land. Of course, other hunters could be attracted to the altered setting (Anderson 1981).

This paper presents the results from the baseline hunter survey, conducted by DNRC in fall 1983. The following sections describe the framework of the study, research hypotheses, results, and what the conclusions will mean for the Phase II (post-construction) survey and impact assessment.

## LITERATURE REVIEW

It is helpful to begin by defining hunting as a recreational activity in which people participate within a recreational setting to enable certain types of experiences or satisfactions, and thereby achieve certain psychological outcomes or benefits (Driver and Brown 1975, 1978; Manfredi, Driver & Brown 1983). By understanding what types of experiences people are seeking through hunting, we can learn about their setting preferences and how likely it is that a given recreational setting will meet their needs (Clark and Stankey 1979).

Hunting, like other recreational activities, is done for many reasons. Some people hunt primarily for the meat, and their satisfaction can be measured by the size or quantity of animals killed. Others may hunt to bag a trophy animal, gaining a sense of achievement from displaying the trophy. Others hunt to be outdoors, walking through the woods and enjoying natural surroundings. Sharing the experience with others, or even just getting some exercise, are all motivations for hunting. To other hunters, seeing wildlife in its natural habitat or having a chance to test their tracking and shooting skills may provide the greatest enjoyment.

Hunters seek these and other types of experiences in different patterns and levels of intensity (Hautaluoma and Brown 1978; Brown et al. 1977; Hautaluoma et al. 1982). Nearly every study of hunting has concluded that hunting is enjoyable for many reasons. In a review of 56 studies, Hendee and Bryan (1978) found that nearly all of the reasons people gave for hunting could be categorized into 16 general types of satisfaction people gain from outdoor recreation. This suggests that hunters share many goals with participants in other activities, such as backpacking. Ashor and McCool (1983), for example, found that hunters and nonhunters visited the Bob Marshall Wilderness for many of the same reasons.



Schole et al. (1973) identified 12 sources of satisfaction among Colorado hunters, including being outdoors, socializing, and escaping from the daily routine. Potter et al. (1973) reached a similar conclusion: "Hunting satisfaction is complex and consists of many elements or aspects of the hunting experience" (p. 220). Their study of Washington state hunters listed 11 dimensions of hunting satisfaction that overlapped Schole and others' categories.

In a national poll, Kellert (1978) found that killing an animal, hunting for sport, and enjoying nature were the broad reasons given for hunting. He believed that although people hunt for all of these (and other) reasons, one reason should be the most important, and the others subordinate. Big game species such as elk are also valued by people who don't necessarily buy a hunting license. To many, wildlife symbolizes environmental quality and the human relationship with nature (Shaw 1978).

Once researchers identified the various dimensions of satisfaction, the next obvious step was to see if hunters could be grouped into categories based on their patterns of satisfactions derived from hunting. This would let resource managers gain a better understanding of their "clients," thus improving their ability to create and maintain satisfying recreational experiences.

Several studies reviewed below have used cluster analysis to group hunters based on types of satisfaction they value. Such analyses first require identifying the dimensions of satisfaction for a given group of hunters. After the hunters are scored on each dimension, their scores across all dimensions are compared. Hunters having similar patterns of responses are grouped together, forming a hunter "type" having common reasons for hunting, attitudes toward possible management actions, and demographic characteristics. This method has also been used to type the attitudes of resource managers toward recreation activities (Allen 1979).

Hautaluoma and Brown (1978) used data collected in Washington state to identify ten types of hunters, each having a different pattern of satisfactions across five dimensions: nature; harvest; equipment; out-group contact; and skill. Brown et al. (1977) used the same method to categorize deer hunters in Colorado into eight hunter types, who differed on attitudes toward three of ten possible management actions, including two dealing with increased access to hunting areas. Hautaluoma et al. (1982) used cluster analysis, along with the demographic correlates of the hunter types, to develop a brief case history for each type, outlining the similarities and differences among the various groups.

This research has a clear application for resource managers. If hunting is done for many reasons, then a multiple-satisfaction approach to game management is necessary (Hendee 1974). The traditional approaches of using game killed or hunter days expended as measures of recreational quality ignore many of the other, sometimes more important, aspects of hunting. Like other recreational activities, hunting is done for different reasons, and identifying these reasons—and for whom they are important—can help resource managers.

## STUDY VARIABLES AND OPERATIONAL DEFINITIONS

DNRC assumed that some hunters—those who value aspects of the setting that could be altered by the transmission line—will be particularly vulnerable to the types of impacts expected to occur. The key variables likely to predict vulnerability to impacts were derived from the literature on the basis of the anticipated effects of the line on hunting areas, and on the hunting satisfactions that seem most dependent on the settings that will be affected. The following variables were measured:

1. The role of nature, harvest, access, convenience, and past experience in recreation setting choice;

2. Hunting style and success; and

3. Hunters' evaluations of the study areas compared to other hunting areas.

Hunters were also asked to indicate on a map where they had hunted.

Following is a discussion of these variables and other aspects of the hunting experience that were considered. Appendix A contains the complete questionnaire.

### Reasons for Hunting in the Study Areas

Nature. Nearly every study on hunting has emphasized the importance to most hunters of being outdoors in a natural area, seeing wildlife in its natural habitat, and getting away from civilization. Although Kellert (1978) found that having a close contact with nature was less important to most hunters than hunting for kill or sport, nature-oriented hunters formed the largest group among people who hunted frequently. He concluded that "The character of the hunting landscape is an important component of such [hunting] quality" (p. 237).

The DNRC questionnaire asked hunters whether enjoying nature was extremely, very, moderately, slightly, or not at all important in their decision to hunt where they did. (This same response format was used in subsequent questions.) The larger the proportion of hunters who enjoy nature, the greater the chance the line or associated development would disrupt their behavior.

Access. DFWP is concerned about the effects of increased access; a 1980 survey of hunters in western Montana found that "...Forest roads and the access they provide are, and will continue to be, a serious threat to the future of big game management in Region 2" (Thomas 1980, p. 1). Asked whether motorized travel should be reduced or increased in the hunting district, 24 percent of the hunters interviewed at check stations indicated that access should be greatly reduced, and 23 percent felt it should be moderately reduced. Thirty-seven percent favored



maintaining present access levels, and only 12 percent wanted to see access moderately or greatly increased.

Access-related issues are thought of both in respect to the number or type of roads and the number of hunters using them. In a study conducted in western Montana, Stankey et al. (1973) asked hunters to define "quality big game hunting." One of the terms frequently used was "non-mechanized access;" the authors concluded that "Excessive road development and attendant problems of easy access (increased hunting pressure, road noise, harassment of animals) appear to be important criteria against which successful hunters judge desirable hunting areas" (p. 240). Some hunters benefit from good road access, while others seek the solitude and feelings of remoteness that are more likely in unroaded settings.

Potter et al. (1973) also found that seeing other hunters detracted more from hunting than it added to the experience. In an economic analysis of deer hunting in Colorado, Miller et al. (1977) found that hunters were less willing to pay for their hunting as hunter density increased. Interestingly, hunters were not willing to pay more for decreases in density, even though they believed that they saw too many other people while hunting.

Heberlein et al. (1982) reached the opposite conclusion: that hunters preferred increased hunter density because it increased the chances of seeing game driven by other hunters. However, this study was conducted at a 9,000 acre Wisconsin wildlife management area, a marshy, flat area ringed with a deer-proof fence. Even in this study, some hunters said the increased game sightings were not enough to make up for increased interference from other hunters. The findings are not considered applicable to the western Montana landscape and hunting population.

Brown et al. (1977) concluded that:

Increasing access to game resources through modification of roads and trails would be received negatively by some hunter types and positively by others. Knowledge of the experience preferences of hunters using particular hunting areas would thus be beneficial to making decisions about where to modify access conditions, or in assessing the recreational impacts of road and trail changes (p. 223).

To determine hunters' attitudes toward access and remoteness, the DNRC survey asked them the importance of hunting in an area with few roads and of hunting in an area with few other hunters. In phrasing the questions this way, DNRC assumed that the study areas were perceived as having few roads and few other hunters. Hunters saying these two reasons were not important in their setting choice could, however, actually be saying that they do not consider the study areas to have these attributes.

The access and remoteness issue was split out to allow better definition of the impacts. For example, it may not be the roads themselves that people object to, but the likelihood that more hunters will use the area. Similarly, other hunters may not mind seeing more people, but object to being around vehicles, or simply being near a road. Each of these access items was scaled similarly to the question on enjoying nature.

Another type of question was designed to measure the perceived adequacy of the existing road system; hunters indicated whether, for hunting purposes, they believed the study areas contained too few, too many, or about the right number of access roads. This question measured perceptions only, which may or may not be related to the actual number of roads in each of the study areas.

Because road hunters could have different views on appropriate levels of access than those hunting primarily away from roads, DNRC categorized hunters as road hunters or non-road hunters based on their responses to a question asking where they hunted.

Hunting Success. The potential for killing a game animal is a component of most peoples' hunting experiences, but not necessarily the most important. In other words, hunting "success" can be obtained without killing an animal. Stankey et al. (1973) summed up much of the research by saying, "Although hunting success is a necessary variable in determining satisfaction, success alone is not sufficient" (p. 240).

Economic studies of hunting have found that hunters are willing to pay more for a license when success ratios are high (Miller et al. 1977) or to prevent a decrease in the number of elk seen (Brookshire et al. 1978). The latter finding suggests that seeing elk adds to the hunting experience, even if one is not killed. DNRC therefore asked hunters how many elk they saw, as a possible factor contributing to perceptions of the study area.

Hunters also were asked the importance of obtaining a trophy animal, and the importance of putting meat in the freezer. Although both involve killing an animal, hunters rating one of these as more important could be affected differently by the transmission line. Trophy hunters would presumably be more concerned over effects on branch-antlered bulls, and meat hunters concerned about effects on all elk. Although these two aspects of harvest have often been lumped together in past studies, it was desirable to separate them to better define impact vulnerability.

### Convenience

The closeness of hunting areas to the hunter's home was also a possible—and often overlooked—motivation for hunting in the study areas. Hunters were asked how important hunting near home was in their choice of recreation setting. If the most important reason someone hunts a given area is simply that it is close, then he or she may continue to hunt there, even if the setting is altered. However, if hunters value hunting nearby in combination with other experiences, such as being in an area

having few roads, then any impacts to the study area gain significance. If hunters do not like the changes in the study area, they may have to travel farther, which would be viewed as negative.

In impact assessment, a distinction is often made between impact magnitude and significance. Magnitude is the size, frequency, or duration of the impact, while significance is the meaning or importance of the impact in a broader context. The convenience item can serve as a measure of significance. For example, an impact to the study area perceived as severe (high magnitude) may not be important (low significance) if other, nearby settings could provide a similar type of hunting experience (Shelby 1984).

#### Experience Hunting in the Area

Hunters who return to the same settings year after year can develop a knowledge of and affinity for these areas. Viewing the area as their "home range," they may respond with "territorial defense" to alterations of their hunting spots (Thomas et al. 1973). They could therefore be more affected by changes in the physical, biological, social, or managerial character of the resource than someone having little experience in the area. They should also be more apt to view the area as one of their favorite places to hunt, and to favor the existing setting. Hunters return to an area, presumably, because they find aspects of it attractive. These more experienced hunters should also be more dependent on a specific area in which to hunt (Bryan 1979).

DNRC asked hunters how many years they had hunted in the specific area they indicated on the map. Hunters using the area for the first year were formed into one group for analysis. The remaining hunters were formed into two groups, those who had hunted less than the median number of years hunted (not including first-time visitors), and those who had hunted more than the median.



### Evaluation of Hunting Area

The role of the study area in providing a certain type of hunting opportunity in western Montana determines the magnitude and significance of impacts from the transmission line. If a person's favorite hunting spot is disrupted, the impact would be perceived as greater than if the affected area is just one of many places a person hunts. Hunters were asked whether the specific area was their favorite place to hunt in western Montana, one of their favorite places, one of many places they hunt, or whether they prefer to hunt elsewhere.

### Other Variables

The questionnaire contained items on date, time, weather, group size, game sought, length of hunt, and animal killed. The question on where hunting was done was asked in part to determine whether they were hunting in one of the study areas. But it also served to anchor the setting-experience preference questions to a specific place. This was emphasized throughout the questionnaire. City and state of residence were also recorded because previous research has found many differences between resident and nonresident hunters.

## METHODS

The survey was conducted during the 1983 big game hunting season, October 25 to November 27. This was not the best year to use as baseline data because for the first time in recent years the season opened on a Tuesday instead of a weekend. The Montana Fish and Game Commission had a plan to rotate opening day throughout the week, opening a different day of the week each year. This plan was eventually scrapped when hunters objected to the change. The timing of the survey, however, was fixed; this was the last hunting season before right-of-way clearing for construction of the transmission line.

The seven check stations, staffed for 91 person-days throughout the season with six interviewers hired by DNRC, consisted of a state vehicle and two signs (one 500 feet up the road and one at the vehicle) similar to those regularly used by DFWP at its enforcement check stations. (In Montana, hunters are required by law to stop at check stations, even if they have not killed any game.)

All hunters who stopped were asked to answer a few questions about their hunting trip. After identifying themselves, the interviewers administered the first half of the questionnaire, recording each hunter's responses on separate forms. If they were hunting in or adjacent to one of the study areas, hunters were asked to complete the second half of the questionnaire themselves, and given a clipboard and pencil. The powerline or purpose of the survey was not mentioned by the interviewers, although some local respondents were aware of the line and guessed that the survey and line were related.

Hunters who had already completed a questionnaire on an earlier visit were not asked to complete another unless they were hunting in a different area or had killed an elk or deer. Repeat hunters (and nonhunters) were noted so that car counter data could be interpreted. (Appendix B contains car counter data).

The first two days of the survey were treated as a pilot study, after which DNRC and the interviewers reviewed the questionnaire and check station methods, refining them as needed. Because no changes were made in questionnaire content, the data from these two days were combined with that from the rest of the study. DNRC monitored the survey continuously, talking almost daily with one or more of the interviewers, and visiting each site. The response rate was extremely high and few problems were encountered.

## RESULTS AND DISCUSSION

During hunting season, about 6,000 hunters passed by the seven check stations (see Appendix B). Questionnaire data were obtained from 664 hunters. Respondents hunting elk in or within one mile of the study areas were also asked to complete the back side of the questionnaires, so some questions had a sample size of 525. Seven hunters went past the check stations without stopping, and seven more stopped but refused to complete the questionnaire, citing a variety of reasons (some of them quite colorful). The final response rate was thus high—about 98 percent. Following is the list of check stations and how many completed questionnaires were obtained at each. Appendix C contains a complete set of data and the coding manual.

<u>Check Station</u>	<u># Days Staffed</u>	<u># Questionnaires</u>
Harvey Creek	10	24
Beavertail	21	227
Cabin City	11	113
Middle Fork Rock Creek	10	70
DeBorgia	10	46
Haugen	17	106
Saltese	<u>17</u>	<u>78</u>
Total	91	Total 664



Ninety-four percent of the hunters were men, and most hunted in small groups: 20 percent were alone, 48 percent in pairs, and 24 percent in groups of three. Nearly all, 86 percent, were hunting for elk. The check stations efficiently sampled study area users; 89 percent hunted inside or within one mile of the study areas. Only one check station, Cabin City, sampled a high rate of people hunting elsewhere (40 percent).

Most were hunting for the day (83 percent), while nine percent were on a two-day trip. Eighty-six percent lived in Montana, and 36 percent of the sample lived in Missoula. Their average age was 36, and they had been hunting big game in Montana for over a decade (mean = 13 years, median = 10). The specific locations where they hunted were coded on a grid system for each study area; maps showing the grids and a table containing these data are in Appendix D.

The following sections describe the key findings; results are given first for the sample as a whole, and then any differences among check stations are described. After these analyses, which involve the total sample, the results of a cluster analysis are presented, along with the implications for distribution of impacts among hunter types. The cluster analysis ties together many of the ideas presented in the following sections.

## Reasons for Choosing Hunting Location

Enjoying Nature. Two-thirds of the hunters (67 percent) said that enjoying nature was an extremely or very important reason they were hunting in the specific area they indicated on the map, while only ten percent said that nature was of slight or no importance (Table 1). Hunters rated this dimension of hunting as the most important in setting choice of any reason listed, a finding consistent with past research. Furthermore, this result was stable across all check stations; a one-way analysis of variance testing for differences among check stations was not significant ( $F = .95, p = .46$ ).

Hunters in the study areas are currently hunting close to the line's future path; 54 percent hunted to within one-half mile of the route, and 18 percent more were within one mile. Furthermore, 70 percent of the hunters would have to cross under the line to reach their hunting areas. This close proximity suggests that any aesthetic impacts would be very noticeable, although some hunters may not be bothered by aesthetic change.

A substantial portion of hunters using the study areas are there primarily to enjoy nature, along with other less important reasons. The transmission line clearing, access roads, and the towers, conductors, and insulators themselves could change the landscape sufficiently to disturb these hunters, a hypothesis that will be tested in the next phase of the hunter survey.

Access. Because 74 percent of those sampled hunted primarily away from roads, one would expect them to value remote hunting areas containing limited road access and not overpopulated by other hunters. This was the case, as over half (54 percent) of the hunters said that being in an area where there were few other hunters was extremely or very important in their setting choice (Table 1). Only one-fifth said this was not much of a factor in their decisions. This finding was stable across check stations ( $F = .95, p = .46$ ), showing that hunters at all check stations valued less-frequented hunting locations.

The other Likert-scaled question on remoteness found that 40 percent rated being in an area having limited road access as an extremely or very important reason in their setting choice (Table 1). Twenty-nine percent said this was unimportant in their decision. An analysis of variance revealed an overall difference among all seven check stations ( $F = 2.3$ ,  $p = .03$ ), but an a posteriori test using Scheffe's procedure found no significant differences between any two check stations ( $p < .05$ ).

Table 1. Hunters' Ratings of the Importance of Reasons for Hunting in the Area  
(Total Sample, N = 528)

	<u>Extremely Important</u>	<u>Very Important</u>	<u>Moderately Important</u>	<u>Slightly Important</u>	<u>Not at all Important</u>
A. To enjoy nature	33	34	23	7	3
B. To put some meat in the freezer	30	23	31	12	4
C. To hunt in a remote area where road access is limited	20	20	31	13	16
D. To get a trophy animal	8	9	28	21	34
E. Because I (or others I know) have hunted here before	12	21	29	22	26
F. Because I live near here	15	17	21	15	32
G. To hunt in an area where there are few other hunters	28	26	25	10	10

These findings can also be interpreted two ways. The preference for limited road access and few other hunters could indicate desire for not seeing or hearing other hunters. It could also, however, indicate a concern over hunting success; increased roads and hunters could be viewed as more competition for game.

A look at the relationship between the two access variables and other questionnaire responses should help to illuminate the reasons behind hunters' preferences regarding road and hunter density. If the importance of being in an area with few roads or hunters is more strongly related to the importance of hunting for meat or a trophy than to enjoying nature, it could be inferred that this preference is based primarily on the desire for decreased competition. If the correlation with enjoying nature is greater, then being in an area where there are few roads and hunters may be viewed more as part of the aesthetic experience. Both of these are probably true—for different types of hunters—but a sense of the overall pattern can be gained by observing correlations within the total sample.

The correlations between being with few hunters and enjoying nature ( $r = .12$ ,  $p < .01$ ) and between few roads and nature ( $r = .29$ ,  $p < .01$ ) were both significant, although of different magnitude. Hunters who rated enjoying nature as important also rated having few roads as important. The strength of those correlations is not great, indicating that only a small percent of the variation in one variable is explained by the other. Yet the pattern of intercorrelations among these variables is important, as well as the magnitude of any specific relationship.

Most hunters did not view the presence of more roads or more hunters as increasing competition for killing some type of animal; the relationships between the importance of having few roads or seeing few humans and hunting for meat were not significant ( $r = .01$ ). For many of these hunters, the aesthetic aspects were more important: the feeling of solitude that comes from seeing few other hunters and the feeling of remoteness that comes from getting away from the road.

The importance of getting a trophy was related to the importance of being in an area with few roads and other hunters, although the correlations were modest in size ( $r = .10$ ,  $p < .02$ ;  $r = .19$ ,  $p < .01$ ). Hunters may feel that the presence of roads and other hunters may decrease their own chances for seeing and killing a trophy elk.



It may thus be concluded that hunters' ratings of the importance of being in an area with few roads or few other hunters are grounded primarily in the aesthetics of the hunting experience and partly in the perceived competition for trophy animals. As shall be seen, different types of hunters have different hunting styles and objectives; the low to moderate correlations expressing these differences will be made more clear in the multivariate cluster analysis.

A paired comparison of mean responses revealed that being in an area where there were few other hunters was more desirable than being in an area having limited road access ( $t = 5.34$ ,  $p < .01$ ). Although this difference was not great, it suggests that many hunters prefer more roads to more hunters. Brown et al. (1977) noted that some hunters might perceive improved access as increasing the chance of harvest, while not substantially increasing the number of other hunters in an area.

However, hunters were not very favorable towards increased road access; 62 percent thought that the existing number of roads was about right, 27 percent thought there were too many, and only 11 percent felt the number of roads was too few. It is not surprising that the majority favored the status quo; if they didn't like the area, they probably wouldn't hunt there, assuming better-liked settings are available. If the number of roads is altered, however, most hunters would prefer to see it lessened, not increased. Many of the volunteered comments received from hunters dealt with access roads, showing the concerns over this issue (see Appendix E for a complete list of those comments).

When the results of Thomas (1980) were collapsed into three comparable categories, 47 percent favored reducing forest road access, 12 percent preferred increases, and 37 percent favored maintaining current levels of access. Although the DNRC data follow this trend, more study area hunters favored the status quo, and fewer wanted reduced access. This could well be a function of interview location. All of DNRC's check stations were located on relatively remote forest roads, while Thomas' hunters were questioned on three major highways in western Montana.

These findings indicate that a substantial portion of the hunters would likely view the new access roads unfavorably. However, if the roads brought in more hunters, as is anticipated, the problem would be even stronger. Installing locked gates on new access roads could mitigate the impact to some extent, but hunters may still object. Of course, new access would be perceived by some hunters as a beneficial impact; the cluster analysis discussion will address this.

Harvest. The hunters interviewed killed 20 elk, 38 deer, and one bear. About 900 total hunter-days were expended to kill the elk, with 45 hunter-days required for each elk, which corresponds roughly to historical figures (DFWP 1978).

The primary aspects of hunting success—putting meat in the freezer and getting a trophy animal—were valued very differently by the hunters. As found in previous research, the prospect of bagging an animal for meat was a primary component of hunting. However, it was slightly less important than enjoying nature ( $t = 3.62$ ,  $p < .01$ ). Hunting for meat (along with hunting in an area where there are few other hunters) was the second most important reason given for setting choice; 53 percent said this was very or extremely important to them (Table 1). Only 16 percent said its importance was low. The findings were stable across check stations, with no differences detected ( $F = 1.6$ ,  $p = .13$ ).

Obtaining a trophy animal, on the other hand, was the least valued reason of all listed, extremely or very important to only 17 percent. An equal proportion said it was only of minor importance, and 34 percent said obtaining a trophy was not a factor in their setting choice at all. It is clear that many other aspects of hunting played a greater role in choosing the area in which to hunt.

Another measure of success was seeing elk. Eighty-four percent of the hunters saw no elk, seven percent saw one elk, three percent saw two, and six percent three or more. A cross tabulation showed that, among hunters for whom getting a trophy was extremely or very important, 29 percent saw two or more elk, compared to 11 percent of those placing little or no emphasis on trophies.

Hunters seeking to get away from other hunters also saw more elk; 21 percent saw two or more, compared to just six percent who viewed hunting in unpopulated areas as less important. As might also be expected, hunters who left roads saw more elk. Ninety-five percent of the road hunters saw no elk, compared to 81 percent of those hunting primarily away from roads. Length of hunt also was related to number of elk seen. Among hunters who hunted for only one day (82 percent of the total), only five percent saw two or more elk. Among those who hunted two days, 16 percent saw two or more elk, and of those who were on a five-day or longer trip, 27 percent saw two or more elk. DNRC concluded that some types of hunters may be more likely to see elk than others, and these types can be distinguished in part by the reasons they chose their hunting locations, as well as by length of hunt.

Convenience. Some hunters said they chose a hunting location in part because they lived nearby; 32 percent rated this as extremely or very important, compared to 47 percent who said it was of little or no importance. Overall, this was the second-lowest factor in setting choice.

An analysis of variance showed a difference among check stations ( $F = 4.37$ ,  $p < .01$ ), and a subsequent Scheffe comparison revealed that hunters interviewed at Saltese said hunting close to home was less important than did other hunters. Saltese hunters were also more likely than other hunters to rate enjoying nature as extremely important. Hunting in an area with few access roads was also more important to this group than to any other.



The other question designed in part to tap a convenience or habit dimension asked about the role of having hunted in an area before. Thirty-six percent said this was an extremely or very important reason they chose to hunt where they did, while a nearly equal number, 39 percent, said it was of little or no importance. No differences among check stations were evident ( $F = .77$ ,  $p = .60$ ).

This variable was related to the other convenience item, living nearby ( $r = .30$ ,  $p < .01$ ), but it remains unclear whether convenience is what is really being measured. People generally return to an area because they like it, and this could be more an indication of satisfaction than convenience. If hunters seeking a package of desired outcomes in settings near their homes are displaced, they could have to travel farther to find a hunting area with the right attributes, such as desired levels of road and hunter density.

#### Experience Hunting in the Area

One-third of the hunters (33 percent) were hunting in the area for the first year, while 13 percent were returning for the second year, and 10 percent for the third. The overall average number of years hunting was six. Two-thirds of the hunters were returning to their hunting areas, presumably because they found some aspect(s) of them attractive. For these returning hunters, the potential for impacts is high, particularly if the changes in the setting conflicted with their desired experiences.

The proportion of first-year visitors varied widely among check stations. First-year hunters comprised 40 percent of those surveyed at Harvey Creek, 39 percent at Beavertail, 23 percent at Cabin City, 16 percent at Middle Rock, 52 percent at DeBorgia, 28 percent at Haugen, and 40 percent at Saltese.

### Evaluation of the Area

In responding to this question, hunters were evaluating the specific hunting area they had indicated on the map. For 89 percent of the hunters, this area was inside or within one mile of one of the three study areas. Sixteen percent said they were hunting in their favorite spot in western Montana and 25 percent said it was one of their favorite places. Another 45 percent said it was just one of many places they hunt, and 14 percent said they prefer to hunt elsewhere. When an analysis of variance showed that check stations differed on this variable ( $F = 10.6$ ,  $p < .01$ ), Scheffe's procedure detected that Beavertail hunters differed from the other groups of respondents. There, only two percent said they were hunting in their favorite area, although 22 percent said it was one of their favorites.

A comparison of Beavertail hunters to the rest of those sampled revealed some interesting differences. More respondents interviewed at Beavertail were not hunting elk: 20 percent, compared to only six percent of the other respondents. A greater percentage were from Missoula (69 percent, compared to 20 percent of the other hunters), and living near the hunting area was rated as more important ( $t = 3.6$ ,  $p < .01$ ). They also saw fewer elk; three percent saw two or more, while 11 percent of the hunters in the other study areas saw at least two. However, Beavertail hunters were no less successful than hunters at other check stations, and in fact they killed more than their proportional share of elk and white-tailed deer. They agreed with other hunters on the importance of nature and remoteness in choosing an area. In summary, Beavertail hunters are probably composed of many different hunter types, which will be explored in the cluster analysis.

For all hunters, evaluation was clearly linked to previous experience in the area. Among first-year visitors, only three percent were in their favorite area, 14 percent were in one of their favorites, and 29 percent said they prefer to hunt elsewhere. Among those having visited the area six or more years, however, 30 percent said it was their favorite, 32 percent said it was one of their favorites, and only four percent said they would prefer to hunt elsewhere. The longer people hunt in an area, the more likely they are to become attached to it and its many attributes.

Evaluation also tended to be linked to success. Among hunters who killed an elk or deer, 60 percent said they were in their favorite or one of their favorite areas, compared to 40 percent of the unsuccessful hunters. A full 89 percent of the hunters who said they were in their favorite area, however, didn't kill anything, suggesting that an area can be viewed very favorably even if no game is harvested.

### Residence

Predictably, Montana residents differed from nonresidents, who were older (average age 42 vs. 35 for residents) and had less big game hunting experience in Montana. All of the out-of-state hunters were after elk, and they killed one-third of the elk despite comprising only 12 percent of the sample. They were also more likely to see elk; 15 percent of the residents saw one or more, compared to 26 percent of the nonresidents. This was in part due to nonresidents' longer length of hunting trip.

The out-of-state hunters were thus more successful. Although many were not as familiar with the area, 44 percent were returning for at least the second time, and some may have been hunting with guides. Fewer of them were road hunters, 26 percent vs. 31 percent of the Montanans. Nonresidents were probably more serious about harvest, having invested more time and money coming to Montana. They were also

trying to harvest game for different reasons. Hunting for meat was less important than it was for residents ( $t = 4.6$ ,  $p < .01$ ), and obtaining a trophy was more important ( $t = 3.9$ ,  $p < .01$ ).

Even though out-of-state hunters were only a small proportion of the sample, they came to Montana in part to shoot a trophy animal, and seemed dedicated to this pursuit. They were also highly concerned with enjoying nature in the study areas.

### Cluster Analysis

A primary goal of the monitoring effort was to determine the distributive effects of the line: who would view the impacts as improvements; who would view them as detrimental; and in what proportions. DNRC hypothesized that the reasons hunters chose for hunting in the study areas will help to predict how they will react to changes in the setting. To reach this goal, it was valuable to group hunters together based on their reasons for hunting where they did. It could then be predicted how each group would respond to the physical, biological, social, and aesthetic changes in the study areas.

The literature review indicated that researchers have used cluster analysis to group hunters on the basis of how much satisfaction they get from hunting, and used the resulting groupings to predict responses to management actions and other variables. The same technique could also be used to group hunters on the basis of their reasons for choosing to hunt in the study areas. Cluster analysis divides a large set of objects (in this case, hunters) into homogeneous subgroups (Lorr 1983), making it well-suited for purposes of the survey.



Hunters' responses to the questions on why they chose hunting locations were selected for the cluster analysis. DNRC asked hunters how important each of seven reasons was in their decision to hunt in the study area: to enjoy nature; to put some meat in the freezer; to hunt where road access is limited; to get a trophy animal; to hunt where they've hunted before; to hunt near home; and to be in an area where there are few other hunters. Responses were recorded on a five-point Likert scale, ranging from "Extremely important" to "Not at all important."

Clustering the hunters on these questions identified subgroups of hunters (hunter types) who had similar patterns of response to these items. In other words, hunters were grouped on the basis of their views regarding the importance of reasons for visiting the study area.

The cluster analysis was performed for the sample as a whole, rather than separately for each study area or check station. Pooling the respondents was justified by the analyses of various and related post hoc tests done earlier; the findings showed that in nearly every case hunters interviewed at the seven check stations did not significantly differ in their responses to the seven items. It therefore is reasonable to combine them into one large group for analysis.

The BMDPKM program (Dixon 1983) was chosen to perform the cluster analysis. Known as a k-means procedure, this hierarchical clustering method first assumes that all respondents form one cluster and at each step divides the cluster into two, based on how close each case is to the cluster center (measured by the Euclidean distance). Once the specified number of clusters is reached, the program iteratively reallocates cases into the cluster whose center is closest.



Because there was no predetermined basis for picking the final number of clusters, the program was run six times to obtain final cluster sizes of 4, 5, 6, 7, 8, and 9. Examination of the results showed that seven clusters best described the hunters, based on comparison of the cluster means for each of the seven variables, cluster sizes, interpretability of the findings, and the desire for a parsimonious explanation. A cluster size of seven (which required 12 iterations to reallocate the cases into clusters) provided important information not present in smaller cluster sizes. Increasing cluster size, however, added little to the analysis while making interpretation more complex.

Hunters within the final clusters should be similar, and differ from hunters in other clusters (Hartigan 1975). Table 2 shows the means of each cluster (hunter type) on each of the variables (importance of reasons for choosing the study area); the same information is shown in a more understandable form (a graph) on Figure 1. Following is a description of the seven hunter types identified, and how the subgroups differed on the various questionnaire items.

Table 2. Cluster Means on Seven Reasons for Hunting in the Area

<u>Variable</u>	<u>Cluster Number:</u>							<u>Grand Mean</u>
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>	
Nature	2.56	2.77	1.60	2.16	1.80	2.05	1.76	2.13
Meat	2.25	2.19	2.53	2.86	2.18	2.39	2.04	2.36
Few Roads	3.81	4.42	2.00	2.59	2.06	3.01	1.92	2.85
Trophy	4.09	4.09	3.96	3.29	4.62	3.21	2.36	3.63
Here Before	4.22	2.87	4.67	2.35	2.31	4.72	2.03	3.20
Live Here	4.52	2.07	2.33	4.56	2.22	4.72	2.14	3.31
Few Others	4.47	2.97	2.14	2.21	2.34	1.94	1.62	2.49

When reading this section, remember that hunters were clustered according to only seven variables—not the total list of possible reasons for hunting in the study areas. The characterizations are based only on these variables, and different results would have been obtained using a different set of questions. The seven were chosen because they have been studied in previous research on hunting and were directly relevant to the transmission line. The seven variables were chosen from an initially longer list, in response to state and federal agency comments. The following descriptions are therefore important to DNRC's research goals.

Cluster One. This group, composed of 64 hunters (12 percent of the total sample), was characterized by the hunters' low ratings of importance on nearly all of the variables; as shown in Figure 1, they rated five of the seven possible reasons as having little importance.

They did indicate that enjoying nature and hunting for meat were moderately to very important. These two reasons were rated as important by all hunter types; everyone wanted to enjoy nature while hunting and also to put some meat in the freezer. Worthy of note, however, for this and the other hunter types, was whether nature or meat was rated as more important. Hunters in Cluster One rated hunting for meat as slightly more important than enjoying nature—one of only two types to do so.

Table 3 shows the distribution of hunters interviewed at each check station across clusters. Hunters in Cluster One were composed of respondents from every check station, reinforcing the decision to pool data for the cluster analysis. Different types of hunters chose the same study area in which to hunt—but for different reasons.

# GRAPH OF CLUSTER MEANS

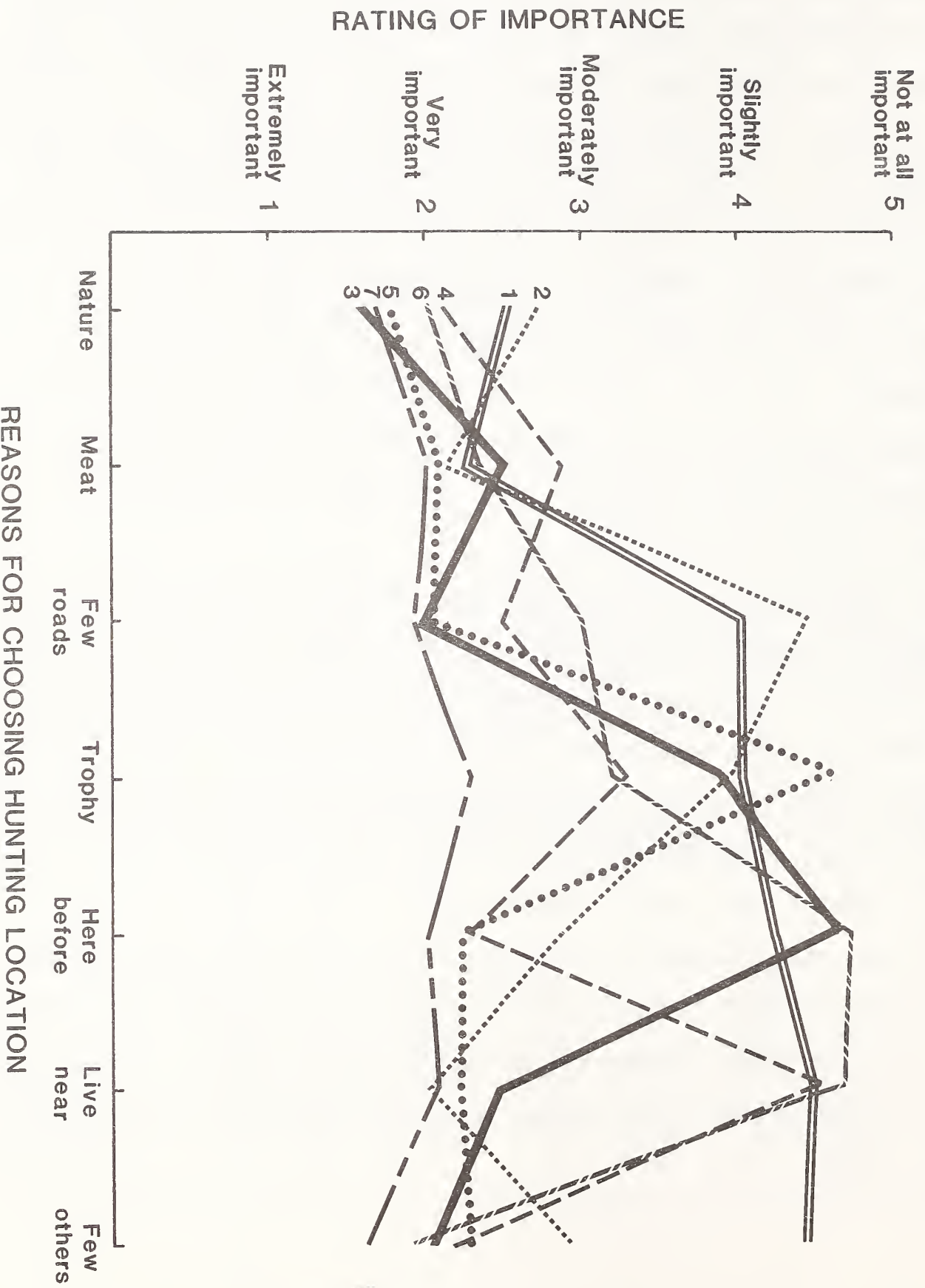


Table 3. Where Hunters from Each Cluster were Interviewed<sup>1</sup>

	<u>Cluster Number</u>						
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>
<u>Check Station</u>							
Harvey Creek	2	1	3	6	2	6	5
Beavertail	41	35	51	17	38	35	42
Cabin City	16	16	14	14	13	11	4
Middle Rock	5	9	12	11	11	8	8
DeBorgia	6	12	6	6	2	5	4
Haugen	16	20	10	21	13	17	27
Saltese	16	6	4	25	17	18	26

<sup>1</sup> Numbers in table are percentages.

Twelve percent of this group was from out-of-state (Table 4), a proportion near the middle compared to other clusters. A full 65 percent were under the median age for all hunters (Table 4); this group had one of the two highest proportions of younger hunters out of the seven clusters. Eighty-six percent were on day trips, a figure near the middle compared to other groups (Table 5).

Table 4. Selected Hunter Characteristics (by cluster)<sup>1</sup>

	<u>Cluster Number</u>						
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>
Percent from out of state	12	5	6	24	3	20	4
Percent aged 33 or younger <sup>2</sup>	65	44	35	51	47	64	51
Percent who killed deer or elk	6	2	12	5	8	12	13
Percent who were primarily road hunters	35	43	37	20	20	23	12

<sup>1</sup> Table numbers are percentages.

<sup>2</sup> 33 was the median age for the entire sample.



Table 5. Length of Hunting Trip (by cluster)<sup>1</sup>

	<u>Cluster Number</u>						
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>
<u>Length of Trip</u>							
One day	86	95	92	70	87	87	78
Two days	8	5	4	13	15	16	12
Three or more days	6	0	4	17	7	7	10

<sup>1</sup> Table numbers of percentages.

A relatively high proportion—35 percent—were primarily road hunters (Table 4), and they tended more than any other group to rate their hunting areas as having too few roads (although the majority still felt that the number of roads was about right; see Table 6). This group had the lowest rate of seeing elk (Table 7) and killing an elk or deer (Table 4) of all groups.

Table 6. How Hunters in the Seven Clusters Rated the Number of Roads in Their Hunting Location<sup>1</sup>

	<u>Cluster Number:</u>						
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>
<u>Rating</u>							
Too few	28	14	4	5	26	19	3
About right	56	72	45	68	67	63	57
Too many	16	14	51	27	30	18	40

<sup>1</sup> Table numbers are percentages.



Table 7. Elk Seen (by cluster)<sup>1</sup>

	<u>Cluster</u>						
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>
<u>Number seen</u>							
0	93	89	90	76	85	79	81
1	3	6	6	12	10	11	3
2 or more	3	5	4	12	5	10	16

<sup>1</sup> Table numbers are percentages.

Along with one other cluster, this group had a very high proportion of hunters visiting the area for the first time--52 percent, with only 22 percent having visited the area for six or more years (Table 8). This group therefore did not rate the area in which they were hunting as one of their favorite places; only six percent said this was the case, the lowest proportion of any cluster (Table 9). Similarly, 31 percent of this group said they would prefer to hunt elsewhere, again the highest percentage of the seven hunter types.

Table 8. Years in Area (by cluster)

	<u>Cluster Number</u>						
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>
<u>Years</u>							
First year	52	22	20	35	16	53	19
2-5 years	26	39	33	34	39	30	40
6 or more years	22	39	47	31	44	17	41

<sup>1</sup> Table numbers are percentages.

Table 9. How Hunters in the Seven Clusters Rated their Hunting Locations<sup>1</sup>

	<u>Cluster Number</u>						
	<u>One</u>	<u>Two</u>	<u>Three</u>	<u>Four</u>	<u>Five</u>	<u>Six</u>	<u>Seven</u>
Favorite	6	15	14	16	24	11	22
One of favorite	12	25	20	30	31	14	41
One of many	50	46	49	47	42	48	30
Prefer to hunt elsewhere	31	14	16	7	3	26	7

<sup>1</sup> Table numbers are percentages.

This group did not seem particularly concerned with many characteristics of the study areas, and though most are from Montana, they didn't choose the area because it was close to home. These hunters, 12 percent of the total, would either favor or not greatly object to the increased road access and would likely not be as concerned as other hunters with the aesthetic changes in the setting caused by the transmission line. They would not likely be displaced by the line, and they may even prefer the new setting to the old.

Cluster Two. This cluster of 80 hunters (15 percent of the total) was the only other cluster to rate hunting for meat as more important than enjoying nature in choosing a hunting location. Hunting in an area with few roads was of little or no importance to them, but they did rate as moderately important being in an area with few other hunters. These hunters may view other hunters as increased competition for game. Obtaining a trophy was of little importance, but hunting close to home was very important in their hunting area decision. Having hunted in the area before was moderately important, near the middle of the seven clusters.

These hunters, interviewed mainly at Beavertail, Cabin City, and Haugen, contained only five percent out-of-state hunters. They tended to be older hunters, with 56 percent over the median age for all hunters, and contained more day hunters than any other type.

This group had the highest proportion of road hunters (43 percent), but also the highest proportion who said the number of roads was about right. As many felt there should be more roads as fewer. They saw an average number of elk (89 percent saw none) but killed fewer elk or deer than did any other hunter type.

They had considerable experience hunting in the area; only 22 percent were hunting where interviewed for the first time, and 39 percent had been hunting there six or more years. Forty percent said they were hunting in their favorite spot (or one of their favorite spots), and only 14 percent said they would prefer to hunt elsewhere.

These hunters are not one of the more vulnerable groups, although the effects could be more adverse than for the first type because they place more value on hunting in a familiar area near their homes and on seeing few other hunters. Although many are road hunters, they do not want to see more roads; because they are more concerned with the number of hunters than with the number of roads, successful closure of new roads would probably effectively mitigate any adverse impacts, as long as large numbers of new hunters did not use the new access. Enjoying nature, although of moderate importance, was rated by this group as less important than by any other cluster, suggesting that any aesthetic impacts would be relatively moderate.

In conclusion, this group of hunters, 15 percent of the total interviewed, would likely not be displaced by the line; they could keep using the study areas as long as the game was still there, and a decrease in the opportunity to shoot a trophy animal may not bother them greatly. However, those hunters who did not like the changes could have a more difficult time finding other attractive hunting locations; they have returned to these areas for many years, and a sizeable minority are hunting in one of their favorite places. Even so, this group may not be strongly affected by the transmission line.

Cluster Three. This was the smallest group (49), comprising only nine percent of the hunters interviewed. They were characterized by their lack of concern on hunting for a trophy or in areas where they have hunted before, and the importance they placed on the other variables. Unlike the previous two hunter types, this group rated enjoying nature as much more important than hunting for meat, and rated nature, few roads, and few hunters as very important. Hunting near home was also valued by this group.

Composed primarily of hunters from Beavertail, this group contained a low proportion of nonresidents (six percent). They were older than other hunters, with 65 percent above the median age (for all respondents), and hunted mostly on day trips. A relatively high number (37 percent) hunted along and near roads, but this group, more than any other, preferred to see far fewer roads in their hunting areas. This was the only cluster in which more hunters rated the number of roads as too many than rated the number as about right. They saw an average number of elk but were more successful (12 percent) than other hunters at killing an elk or deer.

These hunters were older and had more experience than other respondents in hunting in their areas; a full 47 percent had been returning for six or more years. These hunters were average in the ratings of the area; 34 percent said it was their favorite or one of their favorite places to hunt, and 16 percent said they prefer other locations.

Because this group placed high importance on being in an area with few roads and few other hunters, the increased access accompanying the line will likely be viewed as detrimental. The very strong emphasis on nature, especially when viewed relative to the lower emphasis on meat, suggests that the effects on aesthetic aspects of hunting will be considered detrimental. A majority of the hunters would not have a great deal of trouble finding other places to hunt if indeed they feel the need to do so, but some of these hunters value the study area locations highly, in part because of the close proximity to their homes.



In conclusion, this is one of the few groups for whom aesthetic impacts would likely outweigh game-related impacts. They could likely be displaced from the study areas, and if other settings were not available nearby, the impacts would gain significance. For these reasons, this relatively small group (nine percent of the total sample) is more vulnerable to the line's potential effects than are the first two types of hunters identified in the cluster analysis.

Cluster Four. This group, the largest of the seven (100), comprised 19 percent of the total sample. They attached relatively high levels of importance to all variables except hunting close to home, which was viewed as having little or no role in their hunting area decisions. Enjoying nature was more important than hunting for meat; in fact, this group attached less importance than any other hunting group to hunting for meat. They were seeking areas having few roads and few other hunters, and said that their previous hunting experience in the area was important to them. Obtaining a trophy was moderately important.

This cluster had the lowest proportion of Beavertail hunters of any subgroup (only 17 percent), with larger ratios of hunters from Haugen and Saltese. Nearly one quarter, 24 percent, were from out-of-state, the largest percentage of any cluster. Just about half were above and below the median age of the entire sample, and this group, more than any other, hunted for longer than one day--not surprising given the higher number of nonresidents in the group. Few were road hunters (20 percent), and only five percent thought their hunting areas should have more roads. They saw more elk than any other type of hunter but were not quite as successful as most in killing a deer or elk.

One-third were hunting in the area for the first time, and about the same number had hunted there for six or more years. Forty-six percent were hunting in their favorite or one of their favorite areas, and only seven percent said they would rather hunt somewhere else. Like the other groups, most said the area where they were hunting that day was one of many places they hunt in western Montana.



These hunters are nonresidents and residents who value the aesthetics of hunting more than obtaining a trophy or meat, although all aspects of their hunting choice were important. The exception was hunting near home; these hunters are willing to travel farther to find hunting areas meeting their expectations. There is potential for them to be disturbed by the line's effects on aesthetics and access. Because they rated hunting for meat or a trophy as only moderately important, they are apt to be slightly less concerned over any impacts on hunting success. It seems likely that if acceptable substitute settings were available, they would be willing to travel there, somewhat reducing the significance of the impacts.

Cluster Five. This group of 79 hunters composed 15 percent of the hunters interviewed. Their main characteristic was a very high level of concern for all variables except obtaining a trophy. They attached as much importance as any hunter type to enjoying nature, getting meat, hunting where they've been before and near home, and to being in an area with few other hunters. No other group placed less importance on obtaining a trophy.

Like most other groups, this contained a high proportion of hunters interviewed at Beavertail. Very few—only three percent—were from out-of-state, and their ages were mixed. Eighty-seven were out on a one-day hunting trip. A relatively low proportion (20 percent) were hunting primarily along roads, but about as many felt there should be more roads as felt there should be fewer. They were about average in seeing elk and killing elk or deer, despite their extensive experience hunting in the area; only 16 percent (the lowest of all clusters) were first-time visitors, and 44 percent had hunted there for more than six years. More hunters in this group than any other said they were hunting in their favorite place in western Montana, and only three percent (the lowest of all groups) said they prefer to hunt elsewhere.

To these hunters, everything was important except obtaining a trophy. The importance they attached to nature, few roads, and few other hunters highlights their vulnerability to the new access roads and the line's aesthetic impacts. They would also be concerned about decreased opportunity to obtain meat, though they would not likely object if their chances of obtaining a trophy decreased. For them, like the previous two groups, the potential for adverse impacts is high. However, the significance of those impacts is greater for this group, because they also place a high value on hunting near home and say that the affected area is one of their favorites. Impacts of the line may force this group to travel farther and hunt elsewhere, or stay in the same areas with a decrease in perceived hunting quality.

Cluster Six. This group of 83 (16 percent of the total) placed relatively high levels of importance on enjoying nature, getting meat, and being in an area with few other hunters. Of very low importance were hunting near home or in a previously-hunted area. The presence of few roads or chances of obtaining a trophy were moderately important.

Thirty-five percent of the group were interviewed at Beavertail, with Haugen and Saltese also represented. The second highest proportion were from out-of-state (20 percent), part of the reason for their low value on hunting near home. They were younger than any other group except Cluster One; 64 percent were below the median age for all hunters. More than any other group, they stayed out for over a day.

Only 23 percent were primarily road hunters, and the majority rated the number of roads as about right. Equal portions of the group felt there should be more or fewer roads. Twenty-one percent saw one or more elk, and 12 percent killed an elk or deer. Unlike the previous four groups, however, they were relatively inexperienced in the area; only 17 percent (the lowest of any group) had hunted there for six or more years. Like the members of Cluster One, most said the area was one of their many hunting grounds, and over twice as many said they prefer other places as said it was their favorite.

In terms of likely response to the line's effects predicted in Phase I, this group is harder to pin down than the others. They have not hunted where they were interviewed for long, are not particularly attached to those areas, and didn't choose them to hunt near home. Seeing few other hunters was more important than being away from roads in their decisions, suggesting that road closures may be effective mitigation for that portion who either want fewer roads or feel that the current number is about right. This group may not be greatly affected by the line, compared to Clusters Three, Four, and Five. Yet, if they are, they could probably find somewhere else to hunt without great difficulty. They could be more concerned than groups One, Two, and Three if the supply of trophy animals were to decrease, but remain about as concerned as other groups over enjoying nature and hunting for meat.

In conclusion, this type of hunter may not be as vulnerable to the impacts as some of the other groups, but their behavioral responses are more difficult to predict.

Cluster Seven. This group of 73 (14 percent of the total) has a profile that is immediately distinguishable from all other types. They rated every one of the possible reasons as very important, and their ratings across the board were as high or higher than those of any other group.

A low number, seven percent, were nonresidents, but otherwise these hunters shared many characteristics of the nonresident hunters (except their concern for hunting near home). They were of average age, and 22 percent hunted for more than one day on their trip. This group had the lowest proportion of road hunters (only 12 percent), and the lowest number who said there were too few roads (three percent); 40 percent wanted to see fewer roads in their hunting areas. A relatively large proportion saw elk, and a greater number killed an elk or deer (13 percent) than did any other hunter type.

Given this profile, one would expect them to be experienced in their hunting areas, and they were; 41 percent were returning for at least the sixth year, and only 19 percent were first-time visitors. A full 63 percent said they were hunting in their favorite or one of their favorite areas—far more than any other group.

They value hunting in an area perceived to contain few roads and want to see even fewer. They place great emphasis on success, both for meat and trophy, and said that enjoying nature was also very important. They are skilled hunters who are used to the study areas and consider them one of their favorite places to hunt. They also value hunting near home.

These hunters would probably object to the line on many grounds, and their long-established hunting patterns could be disrupted, and they may have a difficult time finding acceptable substitute areas to hunt if they are displaced. In summary, this seems to be the group of hunters most at risk from the transmission line.

## CONCLUSIONS

The results of the baseline study show that a majority of the hunters, about 57 percent, have characteristics that could make them vulnerable to the line's potential impacts. However, some hunters are likely to view the changes as an improvement, and some may not care much one way or the other. The cluster analysis enabled DNRC to identify groups of hunters that could be affected differently by the line or access roads and to hypothesize how each will react to the setting changes. We cannot yet say precisely what will happen, of course, but the next phase of the study will assess the accuracy of our empirically-derived predictions and measure the type and level of impacts to hunting opportunity in the study areas.



The findings to date suggest that, for many, the impact magnitude could be high. Of the hunter types identified, Clusters One and Two (27 percent of the total) are not as likely to be adversely affected, and the net effect may be beneficial. This, of course, depends in part on what happens to the elk populations, which will be studied in the biological portion of the monitoring effort.

Clusters Three, Four, and Five (43 percent of those sampled) will likely be adversely affected. The net impact will depend on whether they have acceptable substitutes, as noted above, but hunters in these groups chose the study areas in part for their perceived limited road access.

For hunters in Cluster Seven (14 percent of the total), both the magnitude and the significance of the impacts are likely to be high, and these users are the most prone to be displaced by the line. It therefore may be anticipated that fewer of this type of hunters will be found in the sample during the next phase; this hypothesis will be tested after the line is built. If they continue to hunt in the study areas, it will likely be out of convenience and with decreased satisfaction. Again, this depends on the impacts to elk; if the hunting were to improve, for example, some of the detrimental impacts could be offset.

The effects on Cluster Six (16 percent) were difficult to predict. Hunters within this cluster may respond differently, depending on how they interpret the impacts.

The magnitude of the impacts to the study areas, however, is only part of the picture; the significance of these impacts also must be examined, along with how the study areas are viewed in relation to other hunting grounds. Hunters who do not like the changes in the study areas may not object if they have many other places to hunt that also meet their criteria (or meet them better than the study areas). The



study area impacts must be placed in a larger context if their significance is to be interpreted. The next phase will accomplish this by asking hunters specific questions about how the attributes of the study area are perceived—before the line, after the line, and in relation to specific attributes of other places they hunt in western Montana.

Most of the nonresident hunters fell into the groups that would likely be adversely affected. Possible economic impacts to local communities could result unless these hunters find other hunting locations near the study areas. Assuming they continue to hunt big game in Montana, however, other communities could benefit. A complete economic impact study, however, is beyond the scope of this research.

So far, topics discussed include impacts to the aesthetic, physical, biological, and social characteristics of the study areas. Another important aspect of recreational settings is the managerial situation (Clark and Stankey 1979). Hunting regulations have a significant effect on hunting area choice. If elk were adversely affected by possible increased hunting pressure and loss of secure habitat, managers may have to change current hunting regulations. The questionnaire did not contain items on perceptions of hunting regulations, but the large number of comments received on the issue (see Appendix E) points to its notoriety among hunters. It is clear that different types of hunters would react differently to new management actions. Previous cluster analytic studies of hunters have found that response to management actions can be predicted from hunter types (Hautaluoma et al. 1982).

Pending approval of the Wildlife Monitoring Committee, reactions to management actions will be assessed during Phase II, when hunters have something specific to respond to (such as access roads). Hunters could be asked how they would prefer to see the new roads managed and other management-related questions. DNRC also plans to assess the effectiveness of visual mitigation and to assess the aesthetic impacts. Hunters' planned use of the study areas will also be measured, and it may be possible to study bow hunters, who were not studied during Phase I.

Access roads were an important consideration to five of the seven clusters identified, or 73 percent of the hunters. It may be that hunters of all types will react negatively to access roads if they are closed with locked gates. Hunters who prefer limited numbers of roads may not approve, but neither would those who want new access roads without locked gates. In any case, it will be important to learn their reactions and see what proportion of hunters favors what management strategy.

For Phase II studies, there is a potential problem in the possibility that current users may be displaced, so that they would not be there to interview. It would be valuable to talk with this group because they would be the most adversely affected by the line (their behavior would have been changed).

This problem will be dealt with in two ways: one based in a change in methodology; and one by the type of analysis that has been and will be conducted. The change in method will be to administer the entire questionnaire to every hunter interviewed—regardless of whether they hunted in or near the study areas. This will provide a control group that has not hunted near the transmission line. In addition, some hunters who do not like the changes in the settings may continue to hunt in the areas (out of convenience, for instance) and will still be there to interview. The baseline study found people who preferred to hunt elsewhere, and the next phase will too.

Second, the baseline data collected in 1983 will be compared to that collected during Phase II. Any substantial changes in hunter populations or types will be detected. For example, another cluster analysis will compare the types of hunters using the study areas.

Subtle changes may not be discernible or attributable to the line and its impacts. But this is compatible with the research goals, for it is likely that minor impacts would create less demand for additional mitigation. Substantial changes, however, would call for a closer look at the magnitude and significance of the impacts (Phase III) and at the need for further mitigation.

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APPENDIX A

SURVEY QUESTIONNAIRE

AND

CODING MANUAL





# MONTANA

## hunter survey



1. We'd like to know why you are hunting here today. Please check the box showing how important each of the following reasons was in your decision to hunt in this area (the area you outlined on the map). Check one box for each item.

I am hunting here:	<u>Extremely Important</u>	<u>Very Important</u>	<u>Moderately Important</u>	<u>Slightly Important</u>	<u>Not at all Important</u>
A. TO ENJOY NATURE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. TO PUT SOME MEAT IN THE FREEZER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. TO HUNT IN A REMOTE AREA WHERE ROAD ACCESS IS LIMITED	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. TO GET A TROPHY ANIMAL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. BECAUSE I (OR OTHERS I KNOW) HAVE HUNTED HERE BEFORE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. BECAUSE I LIVE NEAR HERE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. TO HUNT IN AN AREA WHERE THERE ARE FEW OTHER HUNTERS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In the next questions, THIS AREA refers to the area you indicated on the map. Ask the interviewer if you have questions.

2. How do you feel about hunting in THIS AREA? (Please check one box only)

- ☐ It's my favorite place to hunt in western Montana.
- ☐ It's one of my favorite places to hunt in western Montana.
- ☐ It's just one of many places where I hunt in western Montana.
- ☐ There are other places in western Montana where I prefer to hunt.

3. For hunting purposes, do you feel that the number of roads in THIS AREA is: (check one)

- ☐ Too few
- ☐ About right
- ☐ Too many

4. Could you please tell us where you live? \_\_\_\_\_ City or town \_\_\_\_\_ State

5. Finally, could you please tell us your age?

\_\_\_\_\_ Years old

If you have any comments about the hunting in this area or related issues, please write them here or tell them to the interviewer. Thank you very much for your help!

Note: This is a special survey, and is not the same as the annual telephone survey conducted in January by the Department of Fish, Wildlife, and Parks. If they should happen to call you, please help them out, too!

Check station: \_\_\_\_\_ Questionnaire #: \_\_\_\_\_ Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ am  
pm

Sky cover: ☐ Clear      Temperature: ☐ Warm (>50°)      Sex of respondent:      Number in party:      Status:  
☐ <50% cloudy      ☐ Cool (20-50°)      ☐ Male      \_\_\_\_\_ Men      ☐ Hunter didn't stop  
☐ >50% cloudy      ☐ Cold (<20°)      ☐ Female      \_\_\_\_\_ Women      ☐ Other didn't stop  
☐ Raining      ☐ Hunter stopped, no Q.  
☐ Snowing      ☐ Hunter stopped, Q. completed  
☐ repeat

Hi, I'm with the Department of Natural Resources and Conservation. We're doing a survey of hunters in this area to help the State manage opportunities for hunting. Could I ask you a few questions about your hunting trip today?

(If needed: It will take only about five minutes, and your help would be greatly appreciated)

		Check if kill made	Type killed
1. What are you hunting for this trip?	Elk	<input type="checkbox"/>	_____
	Mule deer	<input type="checkbox"/>	_____
	Whitetail deer	<input type="checkbox"/>	_____
	Other: _____	<input type="checkbox"/>	_____
	Other: _____	<input type="checkbox"/>	_____

2. Did you get an animal? (Record response in second column)

3. What type did you kill? (Record response in third column)

3b. (If Elk was killed) Was this the type of Elk you had wanted to get?

☐ Yes  
☐ No; preference was for \_\_\_\_\_  
☐ Shot first Elk seen  
☐ Other: \_\_\_\_\_

4. Could you show me where you spent most of your time hunting on this trip? (Hand map)

- A. Have hunter draw on map overlay; probe if necessary.
- B. If stay was overnight, try to determine campsites; mark with dot(s).
- C. If Elk was killed, mark location with X on map.
- D. If hunter was in or near study area, show topo map to pinpoint locations.
- E. Transfer information to xeroxed map, and erase overlay.

5. How long did you hunt in this area on this trip? \_\_\_\_\_ Days

6. About how many Elk did you see in this area? \_\_\_\_\_ Elk (ask to everyone)

7. How many years have you hunted in this area? \_\_\_\_\_ Years

☐ First visit to area

8. (If respondent has hunted here before) About how many times a year do you hunt in this area?

\_\_\_\_\_ Times a year

9. How many years have you hunted big game in Montana? \_\_\_\_\_ Years

If respondent was not hunting Elk in or near the study area: Thank you very much for your assistance.

If respondent was hunting for Elk in or near the study area: Could you please answer a few more questions?  
(Hand questionnaire, clipboard, pen to hunter)  
Please ask if you have any questions.

# Coding Manual: 1983 Hunter Survey

<u>Variable</u>	<u>Question #</u>	<u>Variable Label</u>	<u>Column</u>	<u>Value</u>	<u>Value Label</u>
1	-	Check station	1	1	Harvey Creek
				2	Beavertail
				3	Cabin City
				4	Middle Rock
				5	DeBorgia
				6	Haugen
				7	Saltese
2	-	Questionnaire #	2-4	as needed	
3	-	Interviewer	5	1	Bob
				2	Darrel
				3	John
				4	Dick
				5	Ken
				6	Rachael
4	-	Date	6-9	day-month	
5	-	Time	10	1	12-1 PM
				2	1-2 PM
				3	2-3 PM
				4	3-4 PM
				5	4-5 PM
				6	5-6 PM
				7	6-7 PM
6	-	Sky cover	11	1	clear
				2	<50% cloudy
				3	>50% cloudy
				4	rain
				5	snow
7	-	Temperature	12	1	warm
				2	cool
				3	cold
8	-	Respondent sex	13	1	male
				2	female
9	-	Number in group	14	as needed	
10	-	Status	15	1	hunter didn't stop
				2	other didn't stop
				3	hunter stopped, no Q
				4	hunter stopped, Q
				5	repeat hunter
-	-		16	-	-

<u>Variable</u>	<u>Question</u>	<u>Variable Label</u>	<u>Column</u>	<u>Value</u>	<u>Value Label</u>
11	1	Game sought	17	1	elk
				2	mule deer
				3	whitetail
				4	other
				5	combination (incl. elk)
				6	combination (not incl.elk)
12	2	Animal killed	18	1	elk killed
				2	mule deer
				3	whitetail
				4	other killed
				5	combination (incl. elk)
				6	combination (not incl.elk)
				9	no kill
13	3	Type killed	19	1	elk branch
				2	elk spike
				3	elk cow
				4	elk calf
				5	deer buck
				6	deer doe
				7	deer fawn
				8	other
				9	no kill
14	3b	Preference (elk)	20	1	shot preference
				2	preferred branch
				3	preferred spike
				4	preferred cow
				5	shot 1st seen
				6	other
				9	no kill
15	4a	Map used	21	1	topo
				2	Forest Service
16	4b	Study area	22	1	hunted in study area
				2	hunted within 1 mi from study area
				3	hunted within 1-3 mi of study area
				4	hunted > 3 mi from area



<u>Variable</u>	<u>Question</u>	<u>Variable Label</u>	<u>Column</u>	<u>Value</u>	<u>Value Label</u>
17	4c	Road hunting	23	1 2 3	road hunter not road hunter both
18	4d	Road entry	24	1 2 3	came in & left on same road came in & left on different roads not sure
19	4e	Area hunted (1st grid #)	25-26	Grid numbers (99=missing)	
20		2nd grid #	27-28		
21		3rd grid #	29-30		
22		4th grid #	31-32		
23	4f	Kill location	33-34	grid where kill made (99=missing)	
24	4g	Distance from hunting area to line at closest point	35	1 2 3 4 5 6	less than 1/2 mi 1/2-1 mi 1-2 mi 2-3 mi 3-5 mi 5 mi
25	4h	Line crossed to get to area	36	1 2 3	yes no not sure
26	5	Length of hunt	37	# of days hunted	
27	6	# elk seen	38-39	# of elk seen 00 = none	
28	7	Years hunted in area	40-41	# of years 01 = 1st year 02 = 2nd year etc.	
29	8	Days per year	42-43	# days per year	
30	9	Years hunting big game in Montana	44-45	# of years	
31	1a	Nature	46	1 2 3 4 5 9	extremely important very important moderately important slightly important not at all important missing

<u>Variable</u>	<u>Question</u>	<u>Variable Label</u>	<u>Column</u>	<u>Value</u>	<u>Value Label</u>
32	1b	Meat	47	1 2 3 4 5 9	extremely important very important moderately important slightly important not at all important missing
33	1c	Remote	48	1 2 3 4 5 9	extremely important very important moderately important slightly important not at all important missing
34	1d	Trophy	49	1 2 3 4 5 9	extremely important very important moderately important slightly important not at all important missing
35	1e	Here before	50	1 2 3 4 5 9	extremely important very important moderately important slightly important not at all important missing
36	1f	Live here	51	1 2 3 4 5 9	extremely important very important moderately important slightly important not at all important missing
37	1g	Few others	52	1 2 3 4 5 9	extremely important very important moderately important slightly important not at all important missing
38	2	Area rating	53	1 2 3 4 9	favorite one of favorite one of many prefer others missing
39	3	Road rating	54	1 2 3	too few about right too many

<u>Variable</u>	<u>Question</u>	<u>Variable Label</u>	<u>Column</u>	<u>Value</u>	<u>Value Label</u>
40	4a	Residence (city)	55-56	as needed 99 = missing	
41	4b	Residence (state)	57-58	as needed 99 = missing	
42	5	Age	59-60	as needed 99 = missing	



## APPENDIX B

### CAR COUNTER DATA





<u>Check Station</u>	<u>Car<sup>1</sup> Count</u>	<u>Hunter<sup>2</sup> Cars Only</u>	<u>Average Hunters Per Car</u>	<u>Approximate<sup>3</sup> Number of Hunters (Adjusted)</u>	<u>Number<sup>4</sup> Interviewed</u>	<u>Approximate Percent Interviewed</u>
Harvey Creek	135	106	2.3	122	24	20
Beaver-tail	1418	1333	2.3	1533	227	15
Cabin City	989	841	2.3	967	113	12
Middle Rock	724	695	2.4	834	70	8
DeBorgia	384	361	2.2	397	46	12
Haugen	902	884	2.2	972	106	11
Saltese	1310	1127	2.0	1127	78	7

---

<sup>1</sup> From October 25 - November 27

<sup>2</sup> Percent known non-hunter vehicles subtracted from total. Some non-hunters remain in this tally, especially at Saltese, with several homes between the counter and study area.

<sup>3</sup> Hunter cars x hunter per car - 1/2 of total. The number was divided by two because cars were counted coming and going. This number is approximate because at some check stations cars going in did not come out on the same road, and visa-versa.

<sup>4</sup> Number who completed full questionnaire (i.e., repeat hunters, from 1/4-1/2 of the total, did not complete questionnaires again).



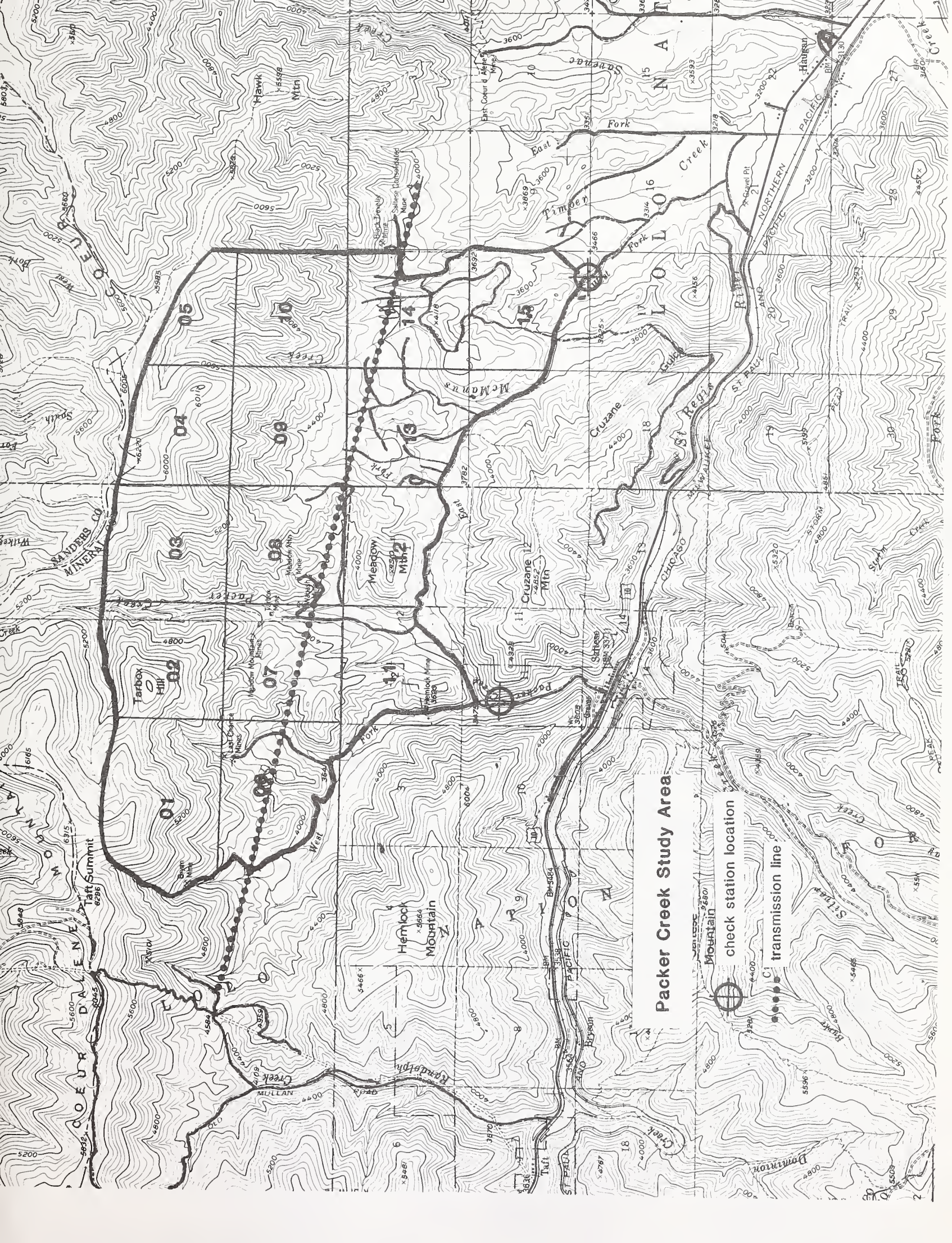
## APPENDIX C

### STUDY AREA MAPS AND GRID LOCATIONS

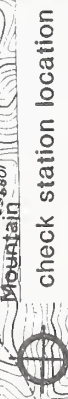
#### WHERE HUNTING TOOK PLACE







Packer Creek Study Area



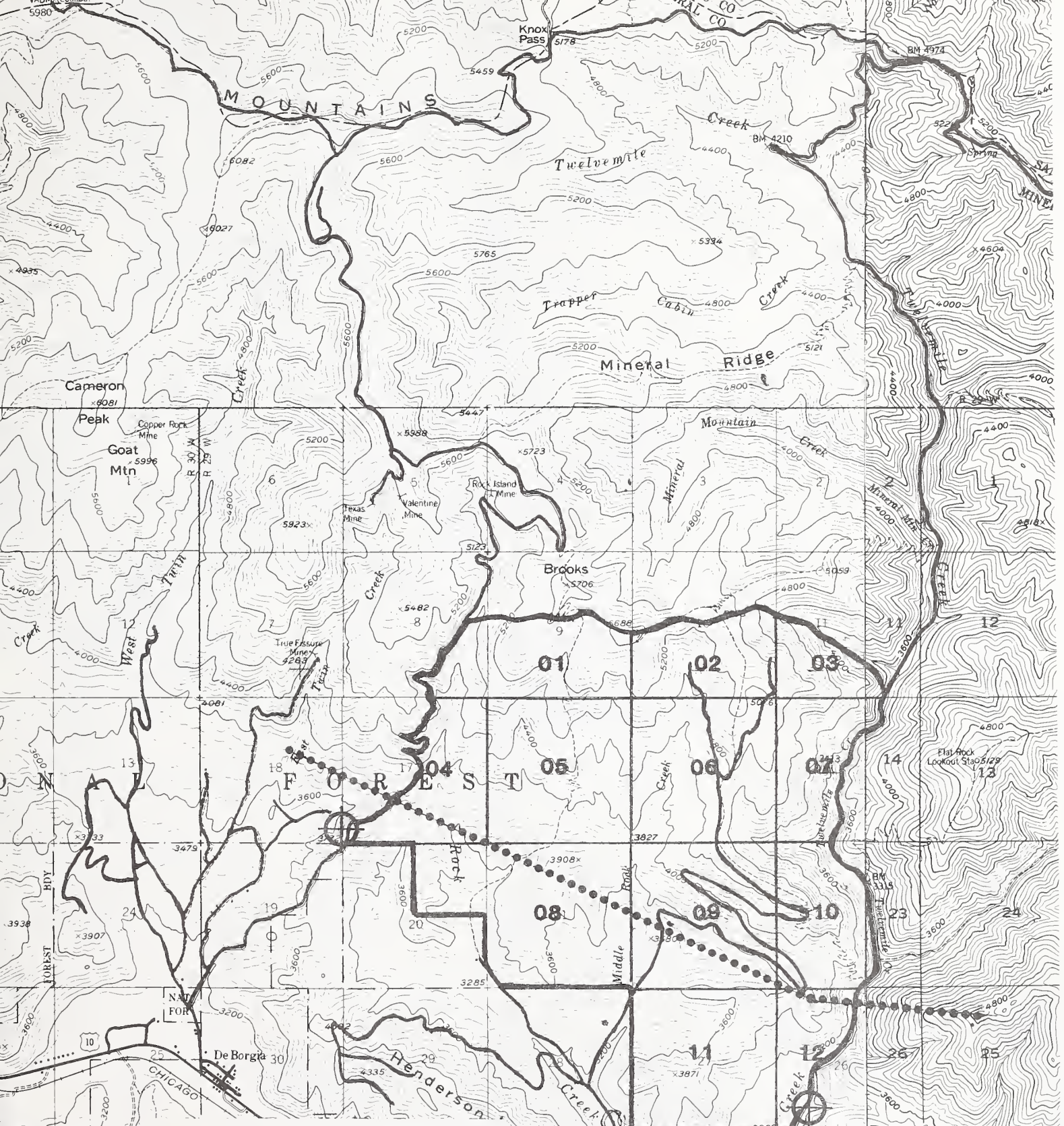
check station location



transmission line







### Middle Rock Creek Study Area



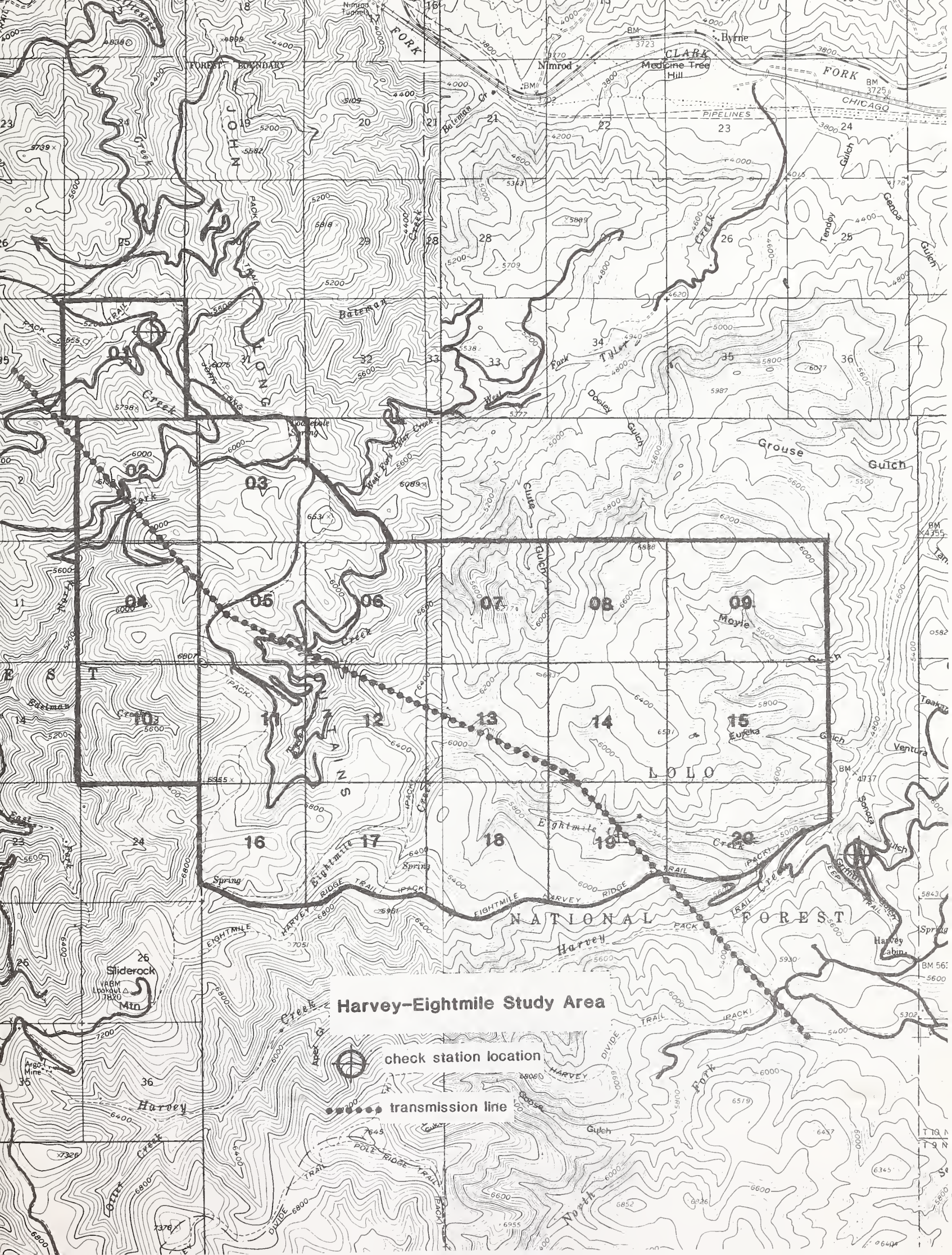
check station location





transmission line







### Harvey-Eightmile Study Area

-  check station location
-  transmission line





# Hunting Locations by Check Station<sup>1</sup>.

<u>Grid #</u>	<u>Harvey</u>	<u>Beavertail</u>	<u>Cabin City</u>	<u>Middle Rock</u>	<u>DeBorgia</u>	<u>Haugen</u>	<u>Saltese</u>
1	—	18	6	6	11	5	15
2	—	31	13	13	—	15	6
3	—	35	4	4	—	3	4
4	—	32	—	6	2	—	7
5	—	39	—	5	3	3	—
6	—	14	—	9	3	5	16
7	—	—	—	5	2	18	9
8	—	—	—	15	6	5	—
9	4	—	—	9	—	—	—
10	—	17	—	2	—	8	5
11	—	43	2	11	—	9	1
12	—	19	3	1	—	7	—
13	—	—	x	x	x	10	1
14	2	—	x	x	x	6	3
15	6	—	x	x	x	12	—
16	5	46	x	x	x	x	x
17	7	21	x	x	x	x	x
18	5	—	x	x	x	x	x
19	4	—	x	x	x	x	x
20	11	—	x	x	x	x	x

<sup>1</sup> The grid numbers are comparable only for check stations within the same study areas (Harvey-Beavertail; Haugen-Saltese; Cabin City-Middle Rock-DeBorgia). The numbers in the table indicate the number of times hunters hunted within the grid. A dash indicates no (measured) hunting use; an x indicates that the map for that study area did not contain the grid number.



APPENDIX D

COMMENTS VOLUNTEERED BY HUNTERS IN SPACE PROVIDED ON SURVEY FORM





## COMMENTS

### Harvey Creek

1. Want trails left open to motorcycles and snow machines—only way to get game out.
2. More game moves into area later in fall.
3. Good place to hunt because pressure is low.
4. Line will cross 5-6 trails in this area; don't close to trail vehicles or snow machines; or can't get game out. Trails are now open—leave them that way.
5. Leave trails open for cycles to get game out.
6. Want to keep using motorized machines on est. trails.
7. Leave roads and trails open to motorized traffic to haul game out—They don't do any more env. damage than horses.

### DeBorgia

1. Usually good hunting.
2. Usually very good hunting and I love it.
3. Some of the seasons are real good in this area and some poor; don't know why, may be the weather.
4. Time to stop the F.S. clearcutting and road building. They are chopping up the game range and elk are suffering.
5. Good place to hunt.
6. Good hunting, with fewer roads it would be better.
7. More gates and road closrues—more personnel enforcing gates.

### Middle Rock Creek

1. Like this area very much; have gotten an elk in '82.
2. No archery or cow season; limit season to 2 weeks.
3. Open and close on same day each season, either sex. Cut the number of out-of-state licenses.
4. The powerline is sure going to screw up the area—I hunt alot here where it will be.
5. Open either sex soon.

6. Too much snow, too many people.
7. Stop BPA.
8. Don't want the power line.
9. Lots of game.
10. I hate the BPA.
11. I don't like the cutting of the trees.

Haugen

1. The special cow permit system is resulting in more cows being killed than if 3 days allowed for either sex, then close area to cows and calves.
2. More residents should get cow permits; prefer to see 5-7 day hunt for cows instead of permits.
3. Need more animals.
4. Trails should be marked and maintained better; should be open for either sex.
5. Too many roads in area are closed.
6. Should regulate hunting; too many hunters.
7. Early bow season interrupts rut; should allow more cattle grazing.
8. All access should be restricted, incld. FS and BPA.
9. If it ain't broke don't fix it.
10. Close this area for bulls for 2-3 years.
11. Open up cow season.
12. One week regulated cow season; no spike bulls--branch only.
13. WA hunter says few animals around w/o snow (opening day) and out-of-states should be told this.
14. Too many outa-staters; dangerous to be around--make them use a licensed guide.
15. Limit number of out-of-state hunters.
16. Hunting's allright.
17. Plenty of game.
18. Very good.

19. Very pretty area, well kept-up, no litter.
20. Lots of out-of-staters.
21. Elk pops. seem to be going down.
22. Would like to see no out of staters.
23. Love the mtns and enjoy MT.
24. Good.
25. No new roads for logging; would have extreme impact on wildlife.
26. Steep, rugged and wet but very beautiful.
27. Too many out-of-staters, too much brush.
28. Nice area.
29. This area better-managed than those around Butte.
30. Need late bow season to hunt snow.
31. Need late bow season to hunt snow.
32. Good.
33. Branch only would greatly improve hunter success in future years. Hunting pressure is worst ever seen
34. " "
35. First 3 days of season should be either sex, instead of cow permits (lots of cows here); branch season only otherwise.
36. OK.
37. Open some of the closed roads.

#### Saltese

1. For the past 7 or 8 years elk have been scarce.
2. Would be nice not to have bow and arrow hunters in this area.
3. Close to cow hunting for a few years.
4. Line will affect this area.
5. The BPA powerline is going to be a disaster as far as elk habitat and access to hunting areas are concerned. Will make access too easy and leave no safe place for elk and deer.



6. One of the very few roadless areas near. Should be left that way.
7. There are so many bow hunters that there should be some regulating so there isn't so much pressure on elk during the mating season.
8. This is my first time here—no comments.
9. The new powerline has moved a lot of elk out—I started hunting here in 1972.
10. Too many hunters now due to all the roads.
11. Not too happy about the powerline going through.
12. I paid 175.00 for an out-of-state license and Montana did not even have the decency to send regulations or any information with it.
13. Too much money for non-res. license; better maps and information needed.
14. Seemed to be a better hunt when it was either sex (1 week) instead of cow permits.
15. Why were there motorbikes up here—they claimed Bushnell and Randolph were not marked.
16. We hunted in 2 roadless areas with pack animals and met 2 motorcycles on the trail—made us all mad.
17. Foolish questions.
18. Like to see less people lining up in Packer Creek.

#### Beavertail

1. Good hunting morning and just before dark.
2. Too many roads and illegal kills.
3. Roads closed in too many areas.
4. Game is getting less plentiful every year. May be due to roads and more people, or due to change in vegetation.
5. Less game this year.
6. Don't like to see too many roads closed (some are ok) because it limits access to elderly and others that can't walk too far.
7. Need more roadless areas.
8. I've hunted in a number of areas in western MT. This is by far the best as far as game and desired numbrs.
9. Too many locked gates. Should be able to use cycles, and to get wood.

10. Too many locked gates; need machine access to retrieve game.
11. Good area but haven't seen deer or elk.
12. Keep roads closed and don't build any.
13. Don't want to have to buy a license for everything as a nonresident.
14. First impression - excellent.
15. Open more gated areas during non-hunting season.
16. Stop clear cutting activities.
17. Fair hunting.
18. Open new roads to motorcycles and snow machines to get game out. Never close trails to trail vehicles.
19. Too damn many locked gates. Taxpayers paid for those roads and should be able to use them. Not a wilderness! If I shot an elk I'd use my cycle to haul it out--locked gate or not.
20. Lot more hunters than I expected.
21. Keep roads closed except for logging purposes. When logging is done close road off.
22. More areas should have more road closures.
23. Close more roads. Limit access beyond W. Fork saddle.
24. Good job of road closures.
25. Am pleased to see the numbers of road closures. Can't have enough of them.
26. Close the roads.
27. More road closures--especially BPA access roads.
28. Hunting here is ok.
29. BPA powerline is going through important cover areas elk use. Object to route chosen. Could have used old Milwaukee line ROW.
30. Appreciate the road closures that are established.
31. Turn back the BPA!
32. Need more road closures (not just spur roads but larger ones). No cow permits, open season for either sex the 1st week, then bulls only.

33. More gate closures on roads and placed lower down, especially on Welch Gillespie turnoff.
34. More gate closures on roads.
35. More gate closures on roads.
36. The more roads you close, the better we like it.
37. The more roads you close, the better we like it.

#### Cabin City

1. Too many gates closed.
2. There should be (no) either-sex hunting.
3. Do not like either-sex over 1st three days.
4. Complete lack of local deer apparently.
5. Proposed logging will be very detrimental for the opportunity of shooting deer or elk; will remove cover, leaving only small isolated cover patches.
6. Do not build more roads in your beautiful forest.
7. Hunting season 5 days bulls, cows; close season within 2 weeks.
8. Shorten elk season by 2 1/2 weeks; start season with either-sex, close with bulls.
9. Shouldn't gate the roads.
10. Would be nice if they plowed the road 12 miles.
11. Fun to hunt. Good area.

## APPENDIX E

STATE AND FEDERAL AGENCY COMMENTS ON DRAFT VERSION OF THIS REPORT





This appendix contains a list of the comments received on the draft version of this report. All the changes requested were made, except for the following:

1. Comment from the U.S. Forest Service regarding Thomas' 1980 road closure study; the data DNRC received from the Forest Service was correct as originally presented.
2. Comment from DFWP regarding comparison of Harvey-Eightmile and DeBorgia study areas, and elk seen in each. The comment makes sense intuitively, but was not supported by the data. The following table shows the percent of hunters who saw elk by check station.

<u>Check Station</u>	<u>% seeing no elk</u>	<u>% seeing 1 elk</u>	<u>% seeing 2 or more elk</u>
Harvey	79	8	12
Haugen	73	14	11
Saltese	82	6	11
DeBorgia	80	4	15
Middle Rock	81	3	16
Cabin City	86	8	6
Beavertail	90	7	3





United States  
Department of  
Agriculture

Forest  
Service

Lolo  
National  
Forest

Building 24  
Fort Missoula  
Missoula, MT 59801

Reply to: 2740

RECEIVED

Date: MAY 29 1984

JUN 01 1984

MONTANA DEPT. OF NATURAL  
RESOURCES & CONSERVATION

Kevin Hart  
Project Coordinator  
Department of Natural Resources and Conservation  
32 South Ewing  
Helena, MT 59620

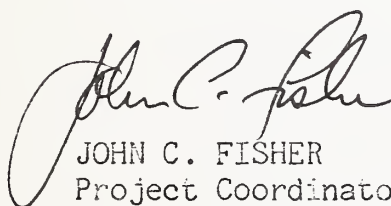
Dear Kevin:

The enclosed paper contains our review comments on the "Hunter Survey Final Report, Phase I - Baseline Study," Draft, dated April 30, 1984.

Our greatest concern is the change in wording of the elk monitoring study objectives (page 3) from those contained in "Plan for Impact Mitigation and Monitoring" (page 21). The objectives as stated in this draft report have a considerably different wording and meaning than those agreed to by the signatories to the mitigation-monitoring plan.

Thank you for this opportunity to comment on the draft report.

Sincerely,



JOHN C. FISHER  
Project Coordinator

Enclosure

cc:  
Dan Bisenius, BPA  
Phil Havens, BPA  
Deerlodge NF  
Mike Hillis







## REVIEW COMMENTS

### HUNTER SURVEY FINAL REPORT, PHASE I - BASELINE STUDY

#### DRAFT

APRIL 30, 1984

Submitted to Montana Department of Natural Resources and Conservation,  
May 29, 1984.

Page 1 - Second paragraph

Change Forest Service lands to National Forest System lands.

- Last paragraph

The reference cited (Elliott 1983), does not contain information on habitat quality or sex ratios for optimum reproduction.

Page 2 - Item 1

Suggest changing the word would to could (first sentence).

- Item 3

The right-of-way width and clearing is misleading as stated. The ROW is 125 wide, with additional individual danger tree marking outside this width as necessary. In any event, continuous clearing of the ROW is not appropriate, nor is it happening. The clearing is more typified by patch cutting.

- Last paragraph

The information we have from Thomas' 1980 road closure study differs from what is stated here. Our information indicates that 47 percent of the hunters favored reduced motorized access, and that 49 percent favored maintaining the existing open access or increasing it somewhat. The last statement is not supported by the study, as it appears that the hunters favor the status quo and trend on closures. (Maybe the way it is stated on page 23 is better.)

Page 3 - Objectives

These are not in agreement with the objectives contained in the mitigation-monitoring plan especially Objective 3, but all are worded differently and carry different meanings. They must agree.

- Third paragraph

The reference cited (Elliott 1983), does not contain objectives of the elk monitoring program, as indicated here.

Page 4 - First paragraph

The elk study areas and names (of areas) are changed from what is identified in earlier reports (e.g., mitigation-monitoring plan, page 21), with no explanation. This has led to confusion and the current problem of having transects located in contracted timber cutting units.

Question: was the FS planning of timber sales part of the selection criteria (third sentence)?

Page 41 and 42

Cluster Seven is stated as being both 14 percent and 16 percent of the total.

Page 45

We currently have an unresolved problem with the Packer Creek transects: two transects overlie an existing timber sale (contracted in 1981).



United States  
Department of  
Agriculture

Forest  
Service

Deerlodge  
National  
Forest

Federal Building  
P. O. Box 400  
Butte, MT 59703

---

Reply to: 2600

Date: May 29, 1984

RECEIVED

MAY 30 1984

MONTANA DEPT OF NATURAL  
RESOURCES & CONSERVATION

Mr. Kevin Hart  
Department of Natural Resources  
and Conservation  
32 South Ewing  
Helena, MT 59620

Dear Kevin:

Thank you for the opportunity to review the hunter survey report. Although I am not qualified to comment on the design of a sociological study such as this, it does appear to me to address the germane questions pertinent to development of roadless areas, as this affects hunter recreation.

I have no specific comments regarding the design of the hunter survey at this time. I would appreciate receiving information regarding Phases 2 and 3 of the hunter survey as it becomes available.

Sincerely,

*Mike*

MICHAEL J. PATERNI  
Wildlife Biologist







## Department of Energy

Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208

In reply refer to: EVHE

June 21, 1984

RECEIVED

JUN 25 1984

MONTANA DEPT. OF NATURAL  
RESOURCES & CONSERVATION

Mr. Kevin Hart  
Department of Natural Resources  
and Conservation  
32 South Ewing  
Helena, MT 59620

Dear Kevin:

We have reviewed Stewart Allen's draft report of April 30, 1984, on the base-line phase of the hunter survey for the Garrison-Taft line. Overall, the report is well-written and clearly presents results of the survey. Below are specific BPA comments:

<u>Page</u>	<u>Paragraph</u>	<u>Sentence</u>	<u>Comment</u>
3	4		The report should be more specific about the schedule for the study, i.e., include schedule by years.
7	2	1	End the first sentence after, "study areas." Begin the next sentence with, "From this, hypotheses were developed to" (continue sentence with, predict . . .).
22	2		Where correlations ( $r$ ) are found to be significant, the magnitude should also be considered ( $r^2$ ). For example, the correlation $r = 0.12$ (corresponding to an $r^2 = 0.0144$ ) indicates only 1.4 percent of the variation is explained by the factor indicating a very weak relation.
25	2, 3		The number of elk seen by hunters is also a function of length of hunt. How does this variable relate to those discussed on page 25?
29	1, 2		Length of hunt should also be considered in the discussion of success of residents vs. non-resident hunters.
29	4	1	Goal of the pre-construction survey was not to determine effects of the line. Survey results were used to develop hypotheses about the potential effects of the line and to provide a basis for assessing effects after construction.



<u>Page</u>	<u>Paragraph</u>	<u>Sentence</u>	<u>Comment</u>
29	4		Have any other studies used this technique to predict and later to assess the effect of some action/activity on hunters?
42 (and elsewhere)	1, 2		Because predictions (not certainties) are being described, the use of words like "may," "could," etc., are more appropriate than words like "will."
47			Tables and figures are usually located in the text following their first mention. All maps, photos, and drawings should be considered figures, with the number and title located at the bottom.
32	Fig. 1		This figure should be drafted using different patterns for the clusters to prevent problems in printing colors.
Comments			Some of the comments mention the powerline. Did the interviewers mention any relationship between the survey and the line, or solicit any discussion about the line?
Cover page			The cover should indicate that the report is submitted to BPA as the sponsoring agency (also include agreement number). The introduction or acknowledgement section should identify cooperating agencies.
1	1	2	The section of line under study in Montana begins at Garrison and extends to Taft.
1	2	1	The alternatives had different magnitudes or levels of effects, not necessarily different effects.
1	4	3	The reference cited to support the sentence is not appropriate. A research report or paper(s) should be cited.
2	1	1	"Would" increase should be changed to "may" increase.
1	3		Also state that the final BPA EIS for the project indicated that a program would be developed to monitor the impacts of the line and assess effectiveness of mitigation measures. (BPA 1983).

<u>Page</u>	<u>Paragraph</u>	<u>Sentence</u>	<u>Comment</u>
1	4	1	After state, delete "officials," and add, "and Federal agencies."
3	2		The objectives should be worded exactly as on page 21 of the Mitigation and Monitoring Plan of October 1983.
3	3	2	The reference listed is not the correct one.
7	3	1	Delete, "Our principal concern was that."
21	4	2	The sentence is confusing and should be reworded.
27	4	3	Sentence is contradictory.
30	4	2	Spelling of "tests."
31	1	2	Spelling of "relocate."
31	2	3	Spelling of "relocate."
41	2	1	Cluster seven is given as 14% and 16% of the total on these pages respectively.
42	5	1	
42	3	2	Delete "may."
45	4		Update discussion of planned logging in the Harvey/Eightmile and DeBorgia study areas.
5			A better map of the study areas is needed.
12	4	3	After "line", add "or associated factors."
15	3	2	Define "Likert-scaled format at first mention."
42	2	3	After "line", add, "or access roads."
44	2		The assessment of hunter reactions to proposed management actions is outside the scope of the monitoring study defined in the October 1983 plan. A draft of the post-construction hunter survey should be submitted to the Wildlife Monitoring Committee for review as soon as possible so this and other points can be discussed.

BPA policy requires that contractor-prepared reports be printed by the Government printing facilities at BPA. Therefore, please plan to submit a camera-ready original for the final report. Questions about graphics format and other printing requirements should be directed to Leroy Sanchez at (503) 230-5511. Also, please let me know how many copies of the final report you believe we should have printed.

Please call if you want to discuss any of our comments.

Sincerely,

A handwritten signature in dark ink, appearing to read "Jack", written over a large, loopy circular flourish.

Jack M. Lee, Jr.  
Chairman, Interagency Wildlife  
Monitoring Committee

**Montana Department  
of  
Fish, Wildlife & Parks**



Helena, Montana 59620  
May 25, 1984

**RECEIVED**

MAY 29 1984

MONT, DEPT. of NATURAL  
RESOURCES & CONSERVATION

Mr. Kevin Hart  
Special Projects Coordinator  
Facility Siting Bureau  
Dept. of Natural Resources and Conservation  
25 South Ewing  
Helena, MT 59620

Dear Kevin:

Attached are our comments on the DNRC Hunter Survey. If you have any questions, please don't hesitate to call me.

Sincerely,

A handwritten signature in cursive script, appearing to read "Arnold".

Arnold Olsen, Ph.D.  
Special Projects Supervisor

AO:kc

Enc.





STATE OF MONTANA  
DEPARTMENT OF FISH, WILDLIFE AND PARKS **RECEIVED**

MAY 22 1984

WILDLIFE DIVISION

## *Office Memorandum*

**TO :** Arnie Olsen

**DATE:** 5/21/84

**FROM :** Gary Hammond

**SUBJECT:** The following are my comments on DNRC's hunter survey:

- p. 3, line 21      ...elk population characteristics are being measured through ground and aerial surveys, incorporating radio telemetry.
- p. 7, line 23      Additionally hunters previously using this area could choose to move into adjacent undisturbed areas, which would result in increased hunting pressure in these adjacent areas, including private lands.
- p. 25, line 2      ...preferred shooting a 6-point bull to a cow...
- p. 25, line 5      It is difficult to compare information from Harvey-Eight & DeBorgia, as the former is much more open country than the latter, a situation conducive to observing elk.
- p. 42, line 13      identified misspelled; also...may are not as likely to be adversely affected?
- p. 42, para. 3      ...and the number of relatively unroaded areas in western Montana is not increasing... this statement is grossly understated as much of western Montana, and specifically the study areas identified in this effort, are to be logged in the immediate future. The cumulative impacts of the transmission line and logging, etc., while not specifically the objective of this effort, should be identified as the greatest threat to the elk resource and hunter opportunity.
- p. 43, end of  
page & p. 44,  
first para.      These statements fail to cite the problem of the Forest Service administering much of the elk habitat in western Montana, while the MDFWP manages the elk resource. The multiple-use mandate of the FS fails to recognize in many cases the value of the wildlife resource.

GH/pm  
enc.







DOE/BP-16380-1  
3CL